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ASTERACEAE IN THE FLORA OF SIND VALLEY, KASHMIR HIMALAYA, INDIA

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ABSTRACT

The Sind Valley of Kashmir, lying northeast of the capital city of Srinagar. Due to its forming a connecting link between the temperate Kashmir Valley and the trans-Himalayan cold-arid Zanskar and Ladakh regions, it depicts considerable diversity in its flora. The present paper provides an account on Asteraceae in the flora of Sind Valley. The largest plant family in this area, Asteraceae are here represented by 143 species belonging to 71 genera under 13 tribes in 5 subfamilies. Four subfamilies – Pertyoideae, Mutisioideae, Carduoideae, and Cichorioideae are represented by a single tribe each, respectively with 2 species in 1 genus, 1 species, 21 species in 11 genera, and 37 species in 18 genera; whereas Asteroideae is the largest subfamily with 9 tribes containing altogether 82 species in 40 genera. Three species, viz. *Helianthus annuus* L., *H. tuberosus* L., and *Chrysanthemum coronarium* L. occur in cultivation only. The genera represented by four or more species each are: *Artemisia* (14), *Saussurea* (9), *Cicerbita* (6), *Aster* and *Lactuca* (5 each), and *Anaphalis*, *Bidens*, *Inula* and *Sonchus* (4 each).

Keywords: Asteraceae/Compositae, Flora, India, Northwest Himalaya, Kashmir Himalaya, Sind Valley.

INTRODUCTION

Kashmir Himalaya is an integral region of the northwest Himalayan biogeographic zone in India and an important part of the Himalayan biodiversity hotspot. It is a mountainous, primarily agricultural region with great heterogeneity in its topography, altitude and climate. The wide variety and gradients in these and other ecological factors result in a great array of habitats that are home to a correspondingly rich floristic wealth.

The Kashmir Himalayan flora has attracted the attention of botanists/naturalists for the last about two and a half centuries [see Stewart (1982) for history of plant collecting in Kashmir]. Some important publications on the flora of this area include those of Royle (1933–1940), Coventry (1923–1930), Blatter (1928–1929), Stewart (1972), Singh & Kachroo (1976), Dhar & Kachroo (1983), Kaul (1986), Sharma & Jamwal (1988, 1998), Singh & Kachroo (1994), Dar & al., (1995, 2002), Singh & al., (2002), Khuroo & al., (2007), and Shabana & al., (2013). Notwithstanding this, a complete, up-to-date Flora of the Kashmir Himalaya is yet to be published.

Sind Valley forms a conspicuous floristic pocket in the Kashmir Himalaya. Being a connecting link between the temperate Kashmir Valley and the trans-Himalayan cold-arid Zanskar and Ladakh regions, Sind Valley is botanically curious, showing an interesting mix of many phytogeographical elements. No worthwhile work was, however, conducted on its flora until recently. To fill up this lacuna, a detailed floristic analysis of Sind Valley has been undertaken by Dar and coworkers since 1980s, some of the aspects of which are dealt with in Dar (1982), Dar & Kachroo (1983a,b), Dar & al., (1983a,b), Dar & al., (1984), Dar & Naqshi (1985a,b,c, 1987, 1990), Dar & al., (1990), Dar & Kachroo (1992), and Dar & Christensen (1999). Provided here is a consolidated account of Asteraceae in the Flora of Sind Valley, Kashmir Himalaya.

MATERIALS AND METHODS

The present paper is a part of the detailed floristic studies undertaken by the first author in Sind Valley. Periodic field surveys were conducted across this valley since 1980s to collect plants from its diverse habitats. Plant specimens so collected were properly processed using standard herbarium techniques, and identified with the help of local Floras, especially Hooker f. (1872-97), Stewart (1972), and Singh & al., (2002). The identifications in Asteraceae were further checked and verified using the most relevant available Floras (Clarke,

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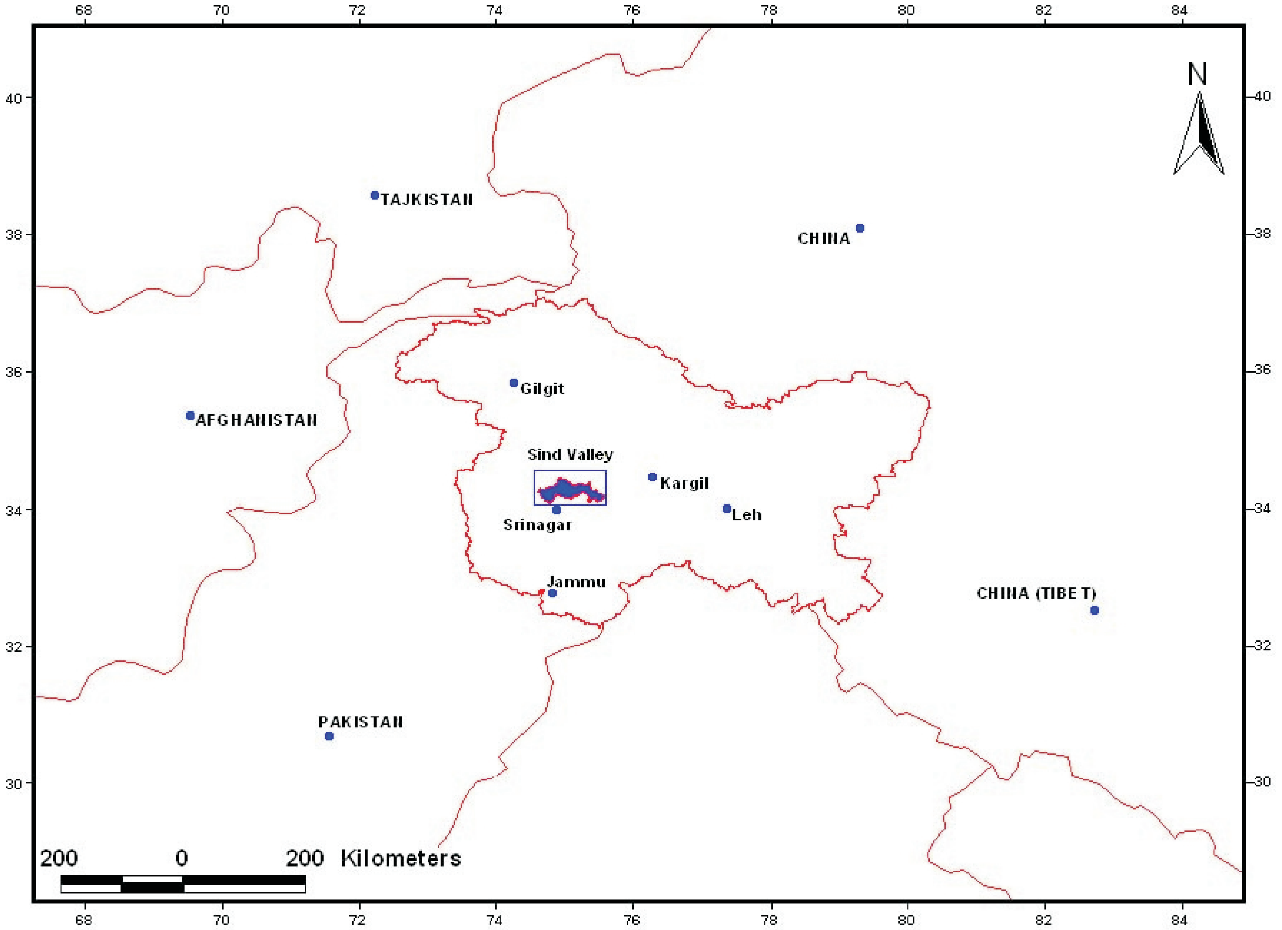

Fig. 1 : Map showing location of Sind Valley in the Kashmir Himalaya.

1876; Hooker f., 1881; Rao & al*.,* 1988; Hajra & al*.,* 1995 a,b; Ghafoor, 2002; Qaiser & Abid, 2003, 2011); together with online Flora of China (Wu & al*.,* 2011), and some other papers on the taxonomy of Kashmir Himalayan Asteraceae (Abid & Qaiser, 2002a,b, 2004, 2007; Roohi & Qaiser, 2010; Shekhar & al*.,* 2013). All the voucher specimens of the plant species included in this paper are deposited in the Kashmir University Herbarium (KASH).

A brief information about the study area is followed by a lucid description of the diagnostic characters and taxonomic treatment of Asteraceae. In dealing with diversity of Asteraceae in Sind Valley, all the genera are keyed out using bracketed key, and then arranged in tribes within their respective subfamilies. With each tribe is given its general world distribution and number of genera and species; for each genus also is given its general distribution and number of presently recognized species. For each species is cited its current valid name, author(s) with protologue, and reference to the subsequent Indian Floras relevant to Asteraceae (Clarke, 1876; Hooker f., 1881; Hajra & al*.,* 1995); followed by its basionym (wherever needed) and important synonym(s). Then follows its brief morphological description, flowering and fruiting, distribution, and specimen(s) examined. For some species, brief and helpful field/taxonomic notes/uses are also appended.

SIND VALLEY: LOCATION AND GEOGRAPHY

The picturesque Sind Valley in Kashmir, lying northeast of Srinagar between 34º.08′–34º.29′ N and 74º.40′–75º.30′ E (Fig. 1). It extends from the Anchar Lake at its lower end to Zoji La in its northeast, covering a road distance of about 100 km, and varies in breadth throughout its length (Fig. 2 & 3). Spreading over two tehsils – Ganderbal and Kangan – the Valley is almost entirely rural in character. The altitude ranges from 1,600 m at Anchar Lake to 5,144 m at the mountain Haramukh.

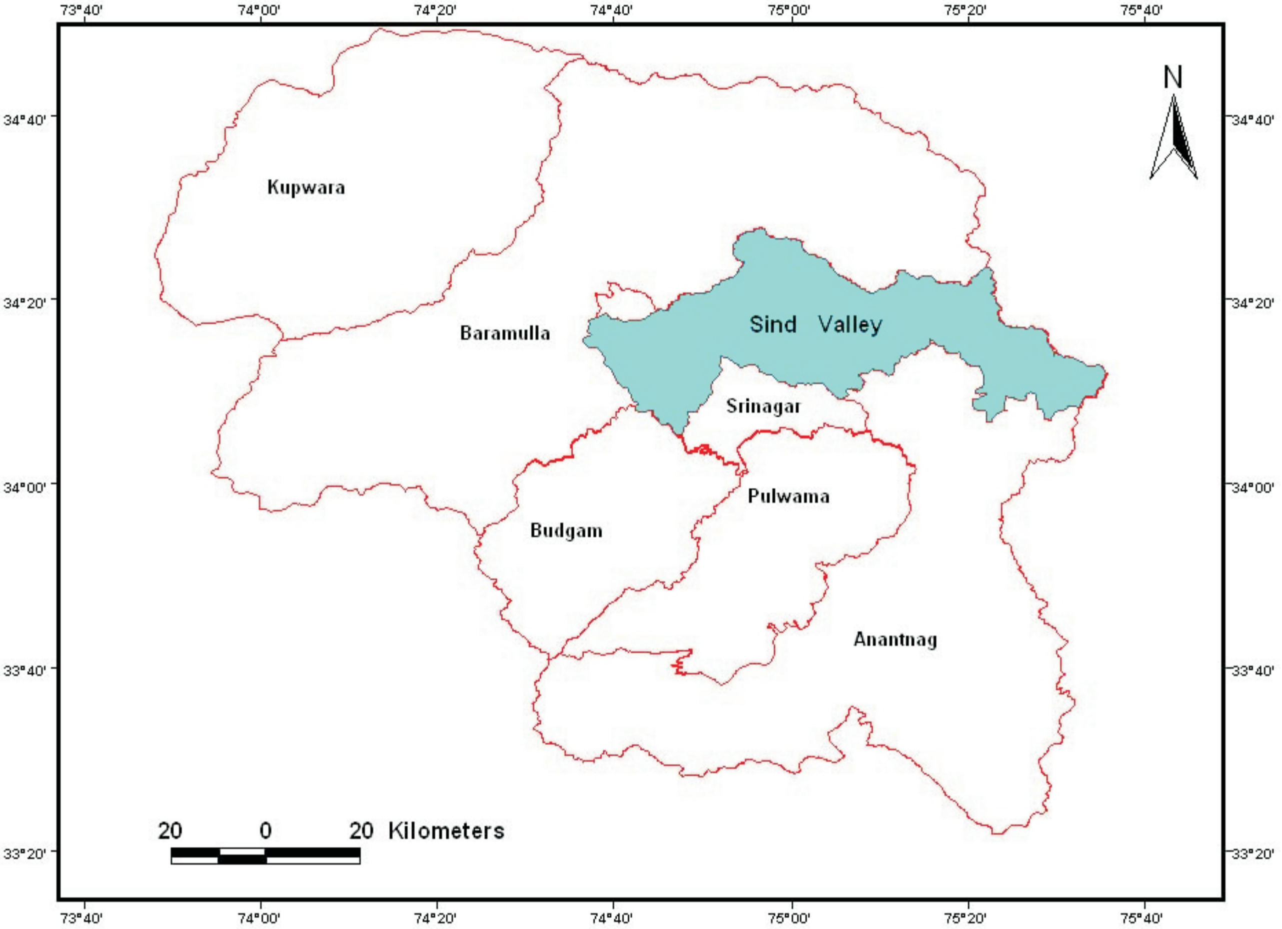

Fig. 2 : Map of Kashmir with demarcation of its districts and position of Sind Valley.

The Valley owes its name to the nullah (river) Sind, which flows throughout its length (Fig. 3 & 4). It is surrounded by high mountainous ranges of the Great Himalaya and forms a transitory belt between the temperate Kashmir and the cold-arid Ladakh. Bestowed with a significant range in altitude, topography and climate, the Valley abounds in a rich and varied flora vis-à-vis its great variety of habitats, viz. lowland and alpine lakes, marshes and swamps, roadsides, graveyards, wastelands, mud walls, cultivated fields and orchards, springs, streams and nullahs, pasturelands, forest lands, mountainsides/slopes, bare rocks, subalpine and alpine meadowlands, etc. The area is famous for a large number of subalpine and alpine meadows, chief among them being Sonamarg, Thajwas, Nichinai, Salnai, Nilnai, Pranshur, Yamhar, Mahalish, etc. Besides, a number of alpine lakes, e.g. Vishansar, Krishansar, Gadsar, Satsar, Yemsar and Gangabal grace the Valley (for main localities in Sind Valley see Fig. 4).

Geologically, Kashmir Valley is said to have been a pre-historic lake called "Karewa Lake" or the Satisara formed in the Pleistocene, drainage of which left it as an alluvium-filled basin. A full sequence of Pleistocene glaciations has been traced in the tributary valleys of Sind. The major portion of the area is covered by Panjal Traps, the rest having sub-recent alluvium and Karewa deposits with a very small portion being occupied by Triassic limestone and other formations of the older age. The main litho units exposed are trap, slate, quartzite, limestone, shale, alluvium, and Karewa clays. The underlying rock determines the various soil formations; depth of soil depending upon slope and dip of the rock; in general, steeper the slope the shallower the soil.

The climate is predominantly temperate with four seasons a year: spring (March–May), summer (June–August), autumn (September–November) and winter (December–February). Spring is the rainiest season, summer the hottest, autumn mild, while the winter is the coldest season with precipitation usually in the form of snow. In the upper temperate and alpine zones, the winter may commence from October–November and

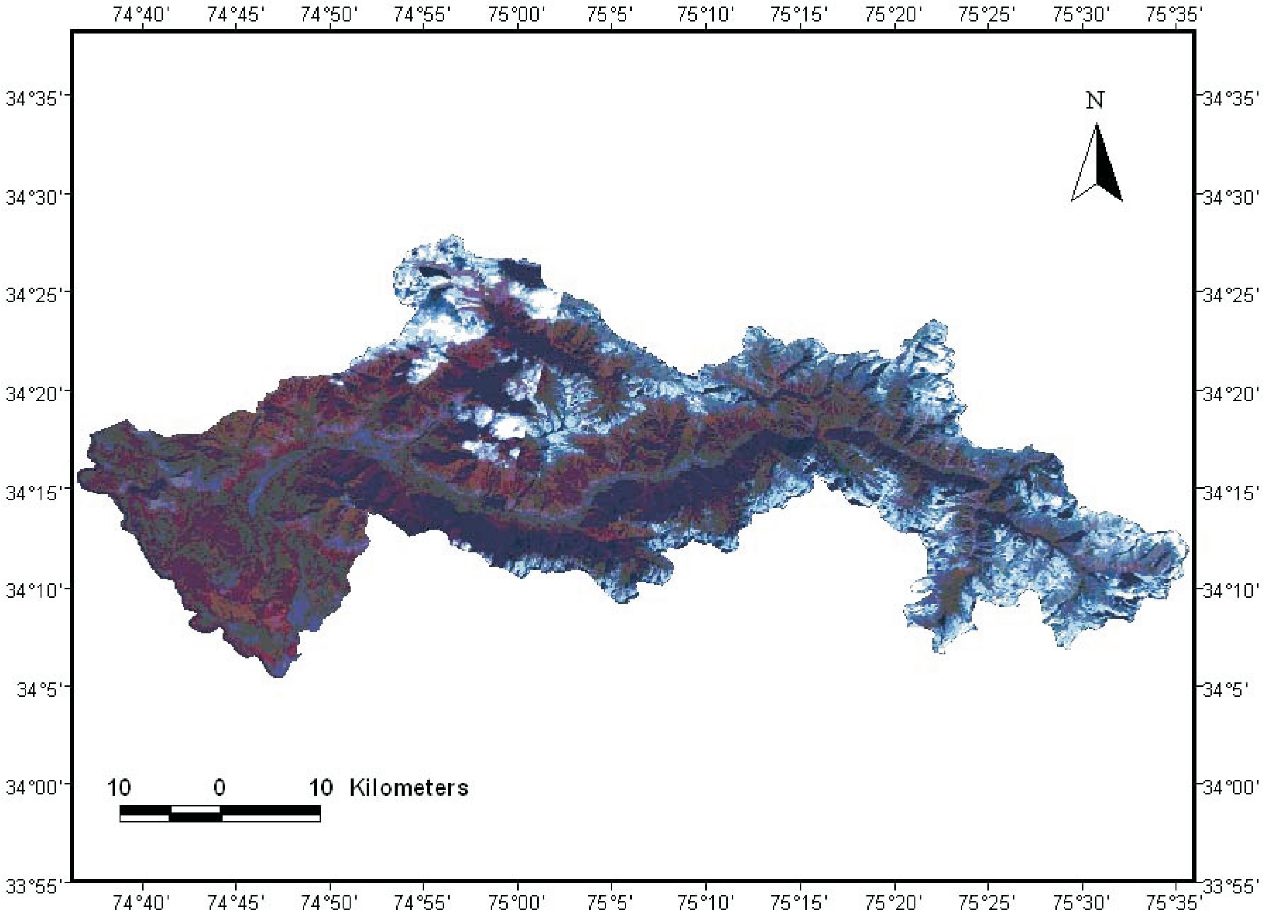

Fig. 3 : Sind Valley: Satellite image.

prolong up to March–April, thus leaving a progressively shorter growing season. The annual precipitation ranges from about 70 cm in the lower Sind Valley to over 225 cm in the alpines, though it considerably decreases at the highest elevations resulting in arid-temperate conditions. The maximum temperature in the lower Sind Valley during summer may reach 36°C and the minimum in the alpine zone during winter may decrease to less than –15°C, the higher altitudes experiencing frost beyond ending November. The relative humidity is very high and remains nearly constant throughout the year, seldom falling below 75% even in the hottest months.

ASTERACEAE: DIAGNOSTIC CHARACTERS AND TAXONOMIC TREATMENT

ASTERACEAE, nom. alt. COMPOSITAE

The main distinguishing character of Asteraceae is that the individual flowers are small (*florets*) and aggregated on a common *receptacle*, subtended by an *involucre* of bracts or *phyllaries*, to form a *capitulum* or floret-head. The receptacle is flat to conical or cylindrical, naked or covered with scales, hairs or bristles, sometimes subtending a floret.

Florets are of two basic types: i) *disc-florets*, which have a regular, tubular, 5-lobed or -toothed (sometimes 4-lobed) corolla, are usually bisexual, and may occupy the centre or whole of the receptacle; and ii) *ray-florets*, which have a basally tubular corolla prolonged into a strap-shaped ligule with 3–5 apical teeth. The ray-florets may occupy the periphery or whole of the receptacle; they are bisexual, female, or sometimes sterile.

A capitulum may be *homogamous* (with all its florets of only one sexual state, i. e. male, female or hermaphrodite), or *heterogamous* (with florets of more than one sexual states). Homogamous capitula may be *discoid* (with only disc-florets, i.e. all florets perfect, with tubular corolla), or *ligulate* (with only perfect ray-florets, i.e. all florets perfect, with ligulate corolla). Heterogamous capitula may be *disciform* (central disc-

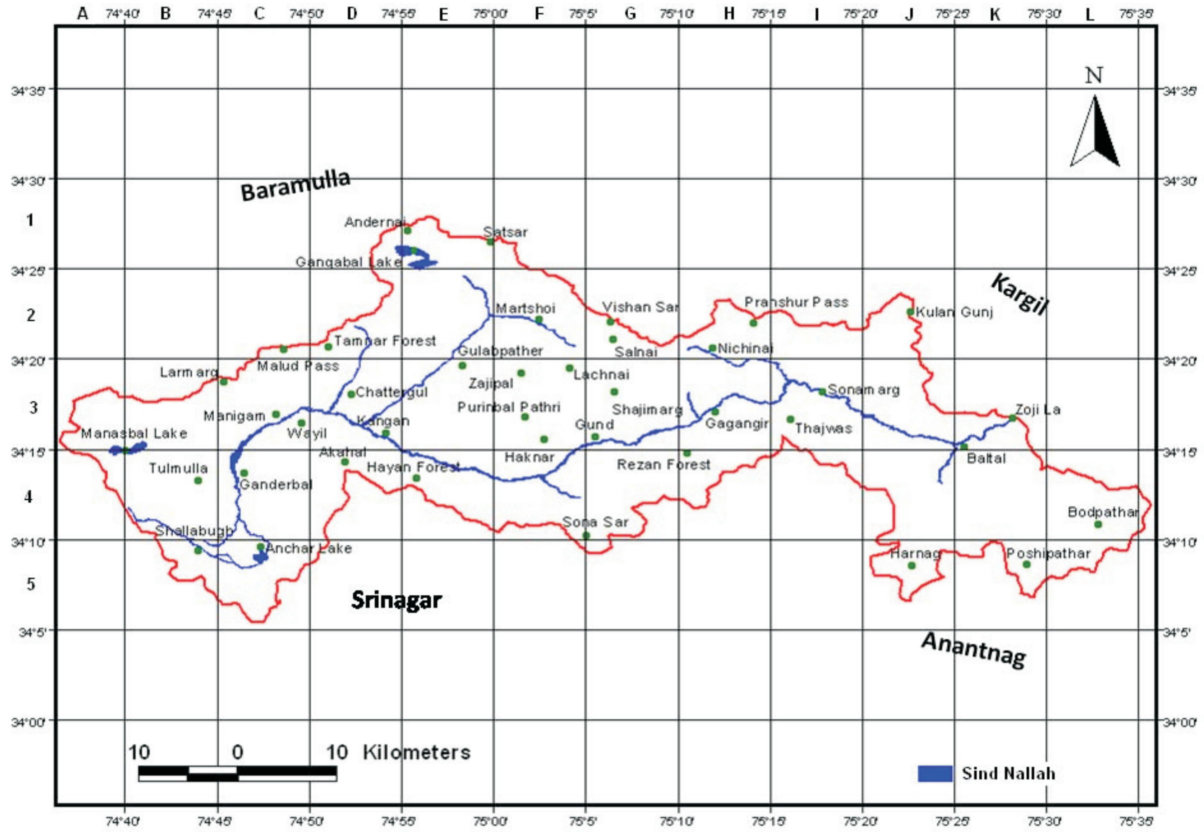

Fig. 4 : Map showing the main localities in Sind Valley.

florets and marginal female florets with eligulate corolla, or with only the latter), *radiate* (marginal ray-florets, either sterile or pistillate, and central disc-florets), or *radiatiform* (marginal florets longer than central disc-florets but not ligulate).

Individual florets are actinomorphic or zygomorphic, and either hermaphrodite, unisexual or neuter. The calyx is in the form of a *pappus* on top of ovary (or absent); corolla is of 5 (or 4) fused petals; androecium of 5 (rarely 4) epipetalous stamens with anthers fused into a tube, through which emerges the 2-branched or simple style terminating the epigynous 1-celled ovary. Fruit an achene (alternatively named cypsela), often with an apical persistent or deciduous pappus.

Asteraceae are the largest family of vascular plants, comprising *c.* 23,000 species in *c.* 1535 genera, classified under 3 subfamilies and 17 tribes (Bremer, 1994). More recently, Funk & al*.,* (2009) presented the current status of our knowledge of the phylogeny and comprehensive suprageneric classification of this family; recognizing *c.* 25,000 species in *c.* 1700 genera, classified under as many as 12 subfamilies and 43 tribes (Bremer, 2010). These authors assume that Asteraceae generally have originated in southern South America, migrated northwards via North America to the Old World and Africa, wherefrom they evolved greatly to achieve cosmopolitan expansion. Presently, the family is worldwide in distribution except Antarctica, particularly abundant in the Mediterranean, semi-arid, temperate, and montane regions of the world. Growing in almost all kinds of habitats, composites have well adapted to varied ecological conditions from aquatic to xerophytic situations.

DIVERSITY OF ASTERACEAE IN SIND VALLEY

Asteraceae are the largest plant family in the Kashmir Himalaya, and represented in the Sind Valley by 143 species belonging to 71 genera under 13 tribes in 5 subfamilies (following Kadereit & Jeffrey, 2007, with modifications after Funk & al*.,* 2009 and Funk, 2010). Four subfamilies – Pertyoideae, Mutisioideae, Carduoideae and Cichorioideae are represented by 1 tribe each, respectively with 2 species in 1 genus, 1 species, 21 species in 11 genera, and 37 species in 18 genera; whereas Asteroideae is the largest subfamily with 9 tribes containing altogether 82 species in 40 genera. Three species, viz. *Helianthus annuus* L., *H. tuberosus* L., and *Chrysanthemum coronarium* L. occur in cultivation only. The genera represented by four or more species each are: *Artemisia* (14); *Saussurea* (9); *Cicerbita* (6); *Aster* and *Lactuca* (5 each); *Anaphalis*, *Bidens*, *Inula*, and *Sonchus* (4 each).

Key to the Genera of Asteraceae in Sind Valley

1a.	Capitula usually homogamous, either ligulate, bilabiate or discoid; disc-florets usually deeply 5-lobed, purplish, pinkish or white, less often yellow; style-branches usually with 1 continuous stigmatic area	2
1b.	Capitula heterogamous, radiate or disciform, less often discoid; disc-florets usually with broad short lobes, usually yellow; style-branches usually with 2 distinct stigmatic areas	32
2a.	Anthers usually tailed at base; capitula usually with 2-lobed corolla or ligulate	3
2b.	Anthers tailed at base or not; capitula ligulate or discoid, but not with 2-lobed corolla	4
3a.	Capitula homogamous, with only disc-florets, having a tubular 5-partite corolla; pappus hairs plumose	1. *Ainsliaea*
3b.	Capitula heterogamous (with both ray- and disc-florets) or homogamous with only disc-florets; pappus hairs simple	2. *Gerbera*
4a.	Plants thistle-like; capitula with tubular disc-florets only, sometimes with sterile outer florets; receptacle usually bristly; juice of plant not milky	5
4b.	Plants not thistle-like; capitula with strap-shaped ray-florets only; receptacle usually not bristly; juice of plant milky	15
5a.	Capitula grouped into a spherical cluster; each capitulum with one floret only	3. *Echinops*
5b.	Capitula separate, not crowded into a cluster; each capitulum with many florets	6
6a.	Leaf margins spinous	7
6b.	Leaf margins not spinous	10
7a.	Achenes with basal areole oblique or lateral	11.*Carthamus*
7b.	Achenes with basal areole horizontal	8
8a.	Stems winged; pappus hairs not plumose	5. *Carduus*
8b.	Stems not winged; pappus hairs plumose	9
9a.	Capitula unisexual	6. *Breea*
9b.	Capitula bisexual	7. *Cirsium*
10a.	Involucral bracts spinescent with hooked bristles	4. *Arctium*
10b.	Involucral bracts not spinescent with hooked bristles	11
11a.	Achenes with basal areole oblique or lateral; involucral bracts often appendaged	12. *Centaurea*
11b.	Achenes with basal areole usually horizontal, rarely oblique or lateral; involucral bracts not appendaged	12
12a.	Filaments papillose; basal areole of achenes oblique or lateral	13. *Tricholepis*
12b.	Filaments glabrous; basal areole of achenes horizontal	3
13a.	Stems erect, simple or branched above; pappus hairs 1 or 2-seriate, plumose; achenes 4–10-ribbed	9. *Suassurea*
13b.	Stems sometimes suppressed; pappus hairs many-seriate, barbellate or plumose; achenes 1–3-ribbed	14
14a.	Achenes 3 or 4-angled	10. *Dolomaea*
14b.	Achenes 4 or 5-angled	8. *Jurinea*
15a.	Pappus present	16
15b.	Pappus absent	18. *Lapsana*
16a.	Pappus paleaceous	17
16b.	Pappus hairy	18
17a.	Plants prostrate; florets yellow; involucral bracts 1-seriate; achenes terete, smooth, curved; pappus 2-seriate	27. *Garhadiolus*
17b.	Plants erect; florets blue; involucral bracts 2-seriate, the outer shorter; achenes angled, many-ribbed or striate, straight; pappus 2 or 3-seriate	31. *Cichorium*
18a.	Hairs plumose	19
18b.	Hairs not plumose	22
19a.	Achenes distinctly beaked	20
19b.	Achenes not beaked	21
20a.	Stems rough with stiff bristly hairs; leaves lanceolate, not equaling the stems; involucral bracts many-seriate	28. *Picris*
20b.	Stems nearly glabrous; leaves narrow-linear, up to as long as the stems; involucral bracts 1-seriate	30. *Tragopogon*

21a. Leaves usually grass-like; stems tall, erect; involucral bracts many-seriate 29. *Scorzonera*
21b. Leaves not grass-like; stems very short, usually subterranean and hollow; involucral bracts 2 or 3-seriate 19. *Soroseris*

22a. Plants scapose; leaves all basal; achenes beaked 20. *Taraxacum*
22b. Plants not scapose; leaves usually not all basal (cauline leaves 0 or a few in *Crepis*); achenes beaked or truncate 23

23a. Perennial herbs, ± stellate-hairy; achenes truncate 26. *Hieracium*
23b. Annual or perennial herbs, not stellate-hairy; achenes beaked or truncate 24

24a. Plants mostly with radical leaves; achenes usually contracted at ends,10–35-ribbed 15.*Crepis*
24b. Plants with radical as well as cauline leaves; achenes distinctly beaked or truncate, 3–20-ribbed 25

25a. Achenes distinctly beaked, beak slender 26
25b. Achenes not or inconspicuously beaked, beak stout (*Youngia*) 30

26a. Beak of achene with a toothed ring below it 14. *Chondrilla*
26b. Beak of achene without a toothed ring below it 27

27a. Involucral bracts black and bristled hairy 28
27b. Involucral bracts not black and bristled hairy 29

28a. Achenes rugose; involucral bracts more than 3-seriate 22. *Cicerbita*
28b. Achenes smooth; involucral bracts 2 or 3-seriate 16. *Dubyaea*

29a. Radical leaves long-petioled; achenes ± rounded, usually smooth 17. *Ixeris*
29b. Radical leaves sessile; achenes flattened, usually with muricate ribs 23. *Lactuca*

30a. Corolla (ligules) purple, blue, violet, pinkish or white 24. *Prenanthes*
30b. Corolla (ligules) yellow 31

31a. Leaves radical as well as cauline; involucre of many rows of bracts; achenes without a beak 25. *Sonchus*
31b. Leaves mainly radical, cauline ones usually a few; involucre of 2 or 3 rows of bracts; achenes narrowed into a stout beak or not 21. *Youngia*

32a. Anthers with tails often branched; style-branches linear, obtuse, non-appendiculate 33
32b. Anthers tailed or not; style-branches usually truncate or appendiculate 35

33a. Capitula disciform; achenes beaked; pappus absent 32. *Carpesium*
33b. Capitula radiate (discoid in *Inula cappa*); achenes not beaked; pappus present 34

34a. Ray-florets 1 or 2-seriate; outer pappus of scales, often forming a cup, inner pappus of hairs 34. *Pulicaria*
34b. Ray-florets usually multi-seriate; outer as well as inner pappus of hairs; hairs unequal 33. *Inula*

35a. Involucral bracts papery, sometimes showy and shiny 36
35b. Involucral bracts neither papery and showy, nor shiny 40

36a. Annuals; receptacle filiform or obconical, paleaceous; ray-florets multiseriate; anther-bases sagittate 37
36b. Perennial herbs; receptacle flat, subconvex or hemispherical, epaleaceous; ray-florets uniseriate; anther-bases entire, subentire or subauricled 38

37a. Receptacle filiform; involucral bracts usually acuminate, ± erect in fruit 36. *Filago*
37b. Receptacle obconical; involucral bracts obtuse to subacute, stellate in fruit 37. *Logfia*

38a. Florets usually fertile; styles divided 38. *Gnaphalium*
38b. Florets usually sterile; styles undivided or merely notched 39

39a. Capitula in a terminal cluster; pappus hairs subconnate at the base 39. *Leontopodium*
39b. Capitula in corymbs; pappus hairs quite free 35. *Anaphalis*

40a. Style of asteroid type, i.e. stigmatic portion of each style-branch prolonged into a short-hairy triangular to lanceolate apical appendage 41
40b. Style not of asteroid type; style-branches usually truncate, minutely hairy at least apically 48

41a. Pappus present, of usually long copious hairs 42
41b. Pappus absent 47

42a. Ray- as well as disc-florets yellow; capitula in scorpioid panicles 40. *Solidago*
42b. Ray-florets blue, pink, purple or white; disc-florets yellow; capitula not in scorpioid panicles 43

43a. Capitula disciform or with inconspicuous ray-florets, as long as or scarcely longer than involucre 44
43b. Capitula radiate; ligules distinctly longer than involucre 45

44a. Stems ribbed; capitula usually many; ray-florets filiform, 2–many-seriate 44.*Conyza*
44b. Stems usually not ribbed; capitula solitary or many; ray-florets ligulate, 1 or 2-seriate, ligules relatively long or broad 41. *Aster*

45a. Ray-florets 1–many-seriate, with minute (c. 3 mm) ligules 43. *Brachyactis*
45b. Ray-florets 2–many-seriate, with prominent (5–8 mm) ligules 46

46a. Capitula with disc- and ray-florets dissimilar in colour; pappus often 2-seriate; achenes of disc-florets ellipsoid or narrowly obovoid, fertile 45 *Erigeron*

46b. Capitula with disc- and ray-florets almost of same colour; pappus usually 1-seriate; achenes of disc-florets narrowly linear, sterile 46. *Psychrogeton*

47a. Leaves all radical, obovate; capitula solitary on naked peduncles; achenes not viscid 42. *Bellis*
47b. Leaves radical and cauline, ovate or lanceolate; capitula paniculate; achenes viscid 47. *Myriactis*

48a. Involucral bracts usually with thin, dry, transparent margins and tips 49
48b. Involucral bracts not with scarious or hyaline margins and tips 59

49a. Capitula disciform or discoid, with all florets tubular 50
49b. Capitula radiate, with marginal florets ligulate 54

50a. Plants up to 15 cm tall, often diffuse; capitula solitary, long-peduncled 57. *Cotula*
50b. Plants more than 20 cm tall, erect; capitula not solitary 51

51a. Capitula homogamous, discoid 52
51b. Capitula heterogamous, disciform 53

52a. Achenes occasionally with resin canals; capitula comparatively large and with several florets, usually in dense corymbs or glomerules; involucral bracts (2–)3 or 4-seriate, ± equal; 50. *Hippolytia*
52b. Achenes without secretory canals; capitula small and with a few florets, in long panicles; involucral bracts (3–)4–7-seriate, unequal 52. *Seriphidium*

53a. Capitula numerous, small, nodding or erect, in large, terminal racemes or panicles; anthers with acuminate apical appendages and obtuse bases; achenes faintly striate, not ribbed 51. *Artemisia*
53b. Capitula solitary, few to many, comparatively larger, not nodding, in flat corymbs; anthers with ovate apical appendages and minutely sagittate bases; achenes 5–12-ribbed 49. *Tanacetum*

54a. Base of disc-corollas pouched and enveloping the tops of achenes 55
54b. Base of disc-corollas not pouched or inflated 49. *Tanacetum*

55a. Pappus present, of rigid, wavy, flattened bristles 48. *Allardia*
55b. Pappus absent or, if present, very short, paleaceous or membranous 56

56a. Capitula usually in dense corymbs; achenes strongly compressed; receptacle paleaceous 53. *Achillea*
56b. Capitula solitary on long peduncles; achenes angled or slightly compressed; receptacle paleaceous or naked 57

57a. Leaves usually 1–3-pinnatisect, rarely simple; receptacle paleaceous 54. *Anthemis*
57b. Leaves entire–toothed, lobed or pinntifid; receptacle naked 58

58a. Corolla-tube of disc-florets terete or 2-winged; limb 4 or 5-fid; achenes 3–many-ribbed, without any mucilage cells or secretory canals, ray and disc achenes ± dissimilar and winged 55. *Chrysanthemum*
58b. Corolla-tube of disc-florets tubular; limb 5-lobed; achenes usually 10-ribbed, with mucilage cells or secretory canals, ray and disc achenes similar and not winged 56. *Leucanthemum*

59a. Involucral bracts in 1–3 rows, fused nearly to apex, punctate; receptacle without scales; anthers not black 66. *Tagetes*
59b. Involucral bracts in 1 or few rows, not fused as above, usually not punctate; receptacle with or without scales; anthers black or not 60

60a. Pappus of white, copious, capillary hairs; involucral bracts in one row, often with an outer series of reduced bracts; receptacle naked; anthers not black 61
60b. Pappus of scales, bristles or awns; involucral bracts in a few rows; receptacle scaly; anthers usually black 68

61a. Style-branches truncate or obtuse, penicillate or with a hairy tip 62
61b. Style-branches flattened or narrowly clavate, papillose, not hairy all around 66

62a. Involucre of 2 or 3 rows of leafy bracts 62. *Doronicum*
62b. Involucre of 1 row of bracts, usually with some smaller additional bracts 63

63a. Leaves with sheathing bases, not lobed; lamina of ray-florets bifid; involucre narrowly campanulate or obconic 61. *Ligularia*
63b. Leaves without sheathing bases, often lobed; lamina of ray-florets (when present) trifid; involucre hemispherical, campanulate or cylindrical 64

64a. Capitula discoid; leaves deltoid or palmately lobed 58. *Parasenecio*
64b. Capitula radiate or discoid; leaves simple, lyrate, or pinnately lobed 65

65a. Leaves usually lyrate-pinnatifid, with a large terminal lobe; heads 12–14 mm across 60. *Jacobaea*
65b. Leaves usually pinnatifid or pinnatisect, without a large terminal lobe; heads 3–8 mm across 59. *Senecio*

66a. Plants scapigerous; leaves all radical; capitula erect, borne apically on long scaly peduncles 67
66b. Plants not scapigerous; leaves both radical and cauline; capitula mostly drooping, borne on naked peduncles 63. *Cremanthodium*

67a. Capitula many 64. *Petasites*
67b. Capitula solitary 65. *Tussilago*

68a. Involucre of female capitula covered with hooked or straight bristles; capitula of two kinds, unisexual 71. *Xanthium*
68b. Involucre of female capitula not covered with bristles; capitula of one kind only, bisexual 69

69a.	Pappus of bristles or scales; involucral bracts neither glandular nor embracing the achenes	70
69b	Pappus absent; involucral bracts stipitate-glandular, inner ones embracing the achenes	69. *Siegesbeckia*
70a.	Achenes dorsiventrally compressed; pappus of 2–4 persistent, rigid, usually retrorsely-barbed bristles	70. *Bidens*
70b.	Achenes laterally compressed; pappus of 2–4 deciduous, scale-like awns or 0	71
71a.	Plants wild; involucral bracts few; receptacle conical or elongate	68. *Galinsoga*
71b.	Plants cultivated; involucral bracts in several series; receptacle flat	67. *Helianthus*

I. **Subfamily Pertyoideae** Panero & V.A. Funk. 2002.

A small subfamily, it comprises a single tribe, Pertyeae.

Tribe Pertyeae Panero & V.A. Funk. 2002, *non* rite publ., validated in Phytologia 91: 569. 2009.

Distributed in Southeast Asia, the tribe comprises 6 genera with c. 80 species. Represented in Sind Valley by 1 genus with 2 species.

1. **AINSLIAEA** DC., Prodr. 7: 13. 1838.

India, Bangladesh, Pakistan, Afghanistan, Bhutan, Nepal, China, Vietnam, Thailand, Indonesia, Myanmar, Philippines, Japan, Korea, Taiwan. Species c. 50, of which 2 occur in Sind Valley.

Key to the species

1a.	Petioles distinctly winged; florets white or bluish-white	2. *A. latifolia*
1b.	Petioles not winged; florets pale-yellow	1. *A. aptera*

1. **Ainsliaea aptera** DC., Prodr. 7: 15. 1838; C.B. Clarke, Compos. Ind.: 247. 1876; Hook.f., Fl. Brit. India 3: 388. 1881; Rao in Hajra & al., Fl. India 13: 165. 1995.

Perennial, sub scapigerous herb with a woody rootstock. Leaves chiefly radical, long-petioled, triangular, ovate or cordate, acute, sinuate-toothed or lobed, roughly pubescent or silky. Flowering stems generally stout and red-brown; capitula solitary or a few together, 1–2 cm long. Involucral bracts multiseriate, acute, with thin margins. Florets pale yellow, longer than involucre, 5-lobed. Achenes 6–7 mm long, obscurely or distincltly 10-ribbed, black; pappus slightly longer than achenes, with a basal reddish-black dot.

Flowering and fruiting: May–August.

Distribution: Temperate Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, through Nepal to Sikkim, Meghalaya and Bhutan; also in E. Afghanistan, Pakistan and China.

Specimens examined: Naranag, 2400 m, forest floor, *G.H. Dar* 4179; Mohanmarg, 2125 m, 7.6.1940, Ludlow & Sherriff 8141; Sonamarg, 2725 m, May 1936, *V. Timins* 127.

2. **Ainsliaea latifolia** (D. Don) Sch.Bip. in Jahresber. Pollichia 18,19: 190. 1861. Rao in Hajra & al., Fl. India 13: 167. 1995. *Liatris latifolia* D. Don, Prodr. Fl. Nepal.: 189. 1825.

Ainsliaea pteropoda DC., Prodr. 7: 14. 1838; Hook.f., Fl. Brit. India 3: 388. 1881.

Perennial herb, with spreading rootstock. Leaves mainly radical, petiolate, ovate-cordate, mucronately-crenulate, acute; petioles winged. Flowering stems scapose; scape simple, erect. Capitula solitary or a few together, in the axils of bracts, with 3 florets. Involucral bracts 2 or 3-seriate, ± spine-tipped, with thin margins. Florets white or bluish-white, to 1 cm long. Achenes 4–5 mm long, 8–10-ribbed; pappus almost twice the length of achenes, pale brown.

Flowering and fruiting: June–September.

Distribution: Pakistan, Himalaya (Hazara, Kashmir eastwards through Nepal to Bhutan), Assam, N. Myanmar, Thailand, Indonesia, Vietnam, Central and Southern China, Taiwan and Philippines.

Specimens examined: Sonamarg, slopes, 10.9.1975, *A.R. Azad* 1120 (KASH); Sonamarg, 19.6.1973, *A.R. Naqshi* 1102 (KASH).

II. **Subfamily Mutisioideae** (Cass.) Lindl., 1829.

Subfamily Mutisioideae comprises 3 tribes wih 74 genera and *c.* 865 species; represented in the study area by 1 tribe - Mutisieae.

Tribe Mutisieae Cass., 1819.

Pantropical in distribution, especially concentrated in south and central America, West Indies, southern North America, tropical and South Africa, Madagascar, tropical, Central and East Asia, Hawaiian Islands and Australia. A small tribe comprising 14 genera with c. 200 species; represented in Sind Valley by only one genus.

2. **GERBERA** L., Opera Var.: 247. 1758, nom. cons.

Distributed in Africa (south Africa to Kenya), Madagascar, Yemen, South America (1 sp. of uncertain affinity), Himalaya, SW. China, Nepal and Bhutan. Species c. 30, of which only 1 occurs wild in the Kashmir Himalaya.

Gerbera gossypina (Royle) P. Beauv. in Bull. Soc. Bot. Genève ser. 2, 2: 40. 1910. Rao in Hajra &al., Fl. India 13: 173. 1995. *Chaptalia gossypina* Royle, Ill. Bot. Himal.: 251, t. 59, f. 2. 1835.

Gerbera lanuginosa (DC.) Sch.Bip. in Flora (Regensb.) 27: 780. 1844; Hook.f., Fl. Brit. India 3: 390. 1881. *Oreoseris lanuginosa* DC., 1838.

Perennial white-haired herb, with elongated thick rootstock. Leaves elliptic-oblong, lanceolate or oblanceolate, lyrate to pinnatifid; upper surface green, puberulous; lower surface persistently white-tomentose; petiole ± winged. Scapes 1–3, very long, brownish, remotely bracteate. Capitula 2–3.5 cm across. Involucral bracts narrow-lanceolate, tapering, pilose. Ray-florets white or pinkish, female, 2-lipped; disc-florets bisexual. Achenes 5–7 mm long, ribbed, pilose or not; pappus whitish, scabrid.

Flowering and fruiting: July–August.

Distribution: Pakistan, Himalaya from Kashmir eastwards to Uttarakhand and Nepal.

Reported from Kashmir by Stewart (1972).

Notes: Stewart (1972: 748) lists another species, *G. nepalensis* Sch.Bip. from Kashmir, which is based on *G. lanuginosa* var. *pusilla* (DC.) Hook.f. (l. c.), and has not been included in Hajra & al., Fl. India 13:173. 1995.

III. **Subfamily Carduoideae** Cass. ex Sweet, 1826.

Depending on circumscription, this subfamily is divided into a varying number of tribes, and comprises 72 genera with *c.* 2400 species; represented in the study area by only one tribe - Cardueae.

Tribe Cardueae Cass., 1819 (syn. Cynaroideae, Cynareae).

Distributed mainly in the northern Hemisphere and Old world, a few genera common in the New world in North and South America. It comprises c. 50 genera with c. 1500 species; represented in Sind Valley by 11 genera with 21 species.

3. **ECHINOPS** L., Sp. Pl. 2: 814. 1753.

Distributed in Europe, Africa and Asia. Species c. 120, of which only 1 is reported from the Sind Valley.

Echinops cornigerus DC., Prodr. 6: 525. 1838; C.B. Clarke, Compos. Ind.: 211. 1876; Hook.f., Fl. Brit. India 3: 358. 1881. Hajra in Hajra & al., Fl. India 12: 178. 1995. *E. coriarius* C.B. Clarke, Compos. Ind.: 212. 1876.

Annual, erect; stem simple, stout, densely leafy. Leaves broadly ovate-oblong, pinnatifid to pinnate, cobwebby above, densely cottony beneath; major lobes further lobulate; lobules spinescent. Capitula 5.5–8 cm across, on stout peduncles. Involucral bracts many-seriate, rigid; outer bracts numerous and covered by long bristles; inner ones connate. Achenes ± oblanceolate, villous.

Distribution: Afghanistan, Pakistan, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal.

Reported from the Sind Valley by T. Thomson at 3000 m (fide R.R. Stewart, 1972).

Notes: The other two species from Jammu & Kashmir are *E. echinatus* Roxb. and *E. niveus* Wall. ex DC.

4. **ARCTIUM** L., Sp. Pl.: 816. 1753 & Gen. Pl. ed. 5: 357. 1754.

Temperate Asia and Europe. Species c. 27, of which only 1 occurs in the Indian subcontinent.

Arctium lappa L., Sp. Pl.: 816. 1753; Hook.f., Fl. Brit. India 3: 359. 1881; Hajra in Hajra & al., Fl. India 12: 155. 1995.

Perennial, erect, coarse and rough herb. Leaves radical and alternate, petioled, broadly ovate-cordate, sinuately toothed, hoary or glabrate beneath. Capitula discoid, globose, 1.6–4 cm, in terminal clusters. Involucral bracts many, subulate, rigid, hooked. Florets purplish. Achenes large, glabrous, angled, finely ribbed.

Flowering and fruiting: July–September.

Distribution: Eurasia; Afghanistan, Pakistan, W. Tibet, W. Himalaya from Kashmir to Uttarakhand, Nepal.

Specimen examined: Haknar, Gund, 2150 m, roadsides, *G.H. Dar* 8803.

Use: Roots are medicinal.

5. **CARDUUS** L., Sp. Pl.: 820. 1753; Gen. Pl. ed. 5: 358. 1754.

Distributed in temperate Europe, N. Africa and Asia. Species *c.* 100, 1 of which occurs in Sind Valley.

Carduus edelbergii Rech.f. in K. Danske Vid. Selsk. Biol. Skr. 8(2) Symb. Afghan. 2: 175. 1955; Hajra in Hajra & al., Fl. India 12: 159. 1995.

Carduus lucidus Wall., 1831, *nom. nud.*; *C. nutans auct. non* L.: Hook.f., Fl. Brit. India 3: 361. 1881; *C. nutans* var. *lucidus* DC., 1838; *C. edelbergii* Rech. f. subsp. *lanatus* Kazmi, 1964. *Chhari Kond.*

Biennial, armed, spinulose herb; stems interruptedly winged. Leaves alternate, oblong, sessile, pinnatifid; margins sinuate, spiny. Capitula discoid, ovoid or globose, solitary or clustered, 2.3–4.5 cm across. Involucral bracts subulate-lanceolate, tips spinous and reflexed; Florets purplish. Achenes obtusely 4-angled, granulate, glabrous; pappus whitish.

Flowering and fruiting: June–August.

Distribution: Afghanistan, Pakistan, W. Tibet, W. Himalaya from Kashmir to Simla, Nepal, N. Africa, W. Europe.

Specimens examined: Beehama, roadsides, 1650 m, *G.H. Dar* 2564; Baltal, 3000 m, rocky slopes, *G.H. Dar* 3949; Nunar, roadsides, 1700 m, *G.H. Dar* 5436.

Notes: Three other species reported from the Jammu & Kashmir State are: C. crispus L., C. pycnocephalus L. and C. tenuiflorus Curtis. Carduus kumaunensis (Arènes) Kazmi reported from this state by Kazmi (1964), and from Sind Valley by Stewart (1972), is said not to have been located in any of the Indian herbaria (Hajra in Fl. India 12: 161. 1995).

6. **BREEA** Less., Syn. Gen. Compos.: 9. 1832.

Often placed with *Cirsium* Mill., it is distributed in W. and N. Asia, China, and Europe. Species c. 6, only 1 species occurs in the Indian subcontinent.

Breea arvensis (L.) Less., Syn. Gen. Compos.: 9. 1832; Hajra in Hajra & al., Fl. India 12: 155. 1995. Serratula arvensis L., Sp. Pl.: 820. 1753.

Cirsium arvense (L.) Scop., Fl. Carn. ed. 2, 2: 126. 1772; *Cnicus arvensis* (L.) Roth, 1797; Hook.f., Fl. Brit. India 3: 362. 1881; *C. candicans* Wall., 1831, nom. nud.

Perennial, erect herb; stems numerous from the base, tomentose upwards. Leaves sessile, oblong, sinuate or pinnatifid, 7–13 cm long cm long, spinous; upper surface pale, rough, lower surface white-tomentose. Capitula unisexual, male and female on different plants, solitary or fascicled. Male heads globose, 1.2–2.8 cm across; female heads ovoid and much longer. Outer involucral bracts ovate or triangular, shortly spine-tipped; inner bracts becoming longer, with undulate, recurved tips. Florets purplish. Achenes smooth, shining.

Flowering and fruiting: June–September.

Distribution: Europe, Asia, introduced in N America; in India it occurs in W. Himalaya from Kashmir to Kumaon, also in W. Bengal and Bihar.

Specimens examined: Saloora, orchards, 1635 m, *G.H. Dar* 2079; Prang, 1750 m, *G.H. Dar* 6218.

Notes: *Breea* Less. is separated from *Cirsium* Mill. due to its unisexual flowers and partial dioecy.

7. **CIRSIUM** Mill., Gard. Dict. ed. 4, 1. 1754.

North temperate regions, N. and E. Africa. Species *c*. 250, of which 2 occur in Sind Valley.

Key to the species

1a.	Capitula 4–7.5 cm across, drooping; inner involucral bracts not with dilated tips	1. *C. falconeri*
1b.	Capitula 1.5–3.6 cm across, erect; inner involucral bracts with dilated tips	2. *C. wallichii*

1. **Cirsium falconeri** (Hook.f.) Petrak in Feddes, Repert. 9: 198. 1911. Hajra in Hajra & al., Fl. India 12: 169. 1995. *Cnicus falconeri* Hook.f., Fl. Brit. India 3: 363. 1881.

Cirsium verutum auct. non (D. Don) Spreng.: Kitam. in Fl. E. Himal. 330. 1966; *C. involucratum auct. non* DC.: Kitam. in Fa. & Fl. Nepal Himal. 250. 1955; *Cnicus involucratus auct. non* (DC.) Hook.f. : Hook.f., Fl. Brit. India 3: 362. 1881.

Perennial, robust herb; stems villous. Leaves membranous, setose and strongly spinescent above, cottony beneath, sinuate-lobed or subpinnatifid with 1–2.5 cm long terminal spines. Capitula globose, 4–7.5 cm across, subsolitary, drooping, densely woolly. Involucral bracts lanceolate, woolly and densely covered by long yellow spines, all ending in a long, slender, flexuous spine. Florets 2–2.5 cm long, pale yellow. Achenes pappose.

Flowering and fruiting: July–September.

Distribution: Himalaya from Kashmir to Bhutan, Myanmar and S. Tibet.

Specimen examined: Sonamrg, banks of Sind nullah, 2700 m, *G.H. Dar* 8797.

Notes: Kitamura & Gould (in Hara, Enum. Fl Pl. Nepal 3: 146. 1982) consider *Cirsium falconeri* (Hook.f.) Petrak to be a variable taxon, exhibiting considerable variation from Kashmir to eastern Himalaya; thereby suggesting involvement of several species.

2. **Cirsium wallichii** DC., Prodr. 6: 643. 1838; Hajra in Hajra & al., Fl. India 12: 171. 1995.

Cnicus arachnoideus Wall., 1831, nom. nud; *C. cernuus* Wall., 1831, nom. nud.; *Cirsium nepalense* DC., 1838; *C. argyracanthum* auct. non DC.: Wight, 1846; *Cnicus argyracanthus* var. *nepalensis* (DC.) C.B. Clarke, 1876; *C. wallichii* (DC.) C.B. Clarke, 1876; Hook.f., Fl. Brit. India 3: 363. 1881; *C. wallichii* var. *nepalensis* (DC.) Hook.f., var. *cernua* Hook.f., var. *fasciculata* Hook.f., and var. *platylepis* Hook.f., in Hook.f., Fl. Brit. India 3: 364. 1881.

Biennial, pubescent herb; stems branched, spreading, grooved. Leaves sessile, sinuate-pinnate lobed, glabrous or the lower surface white-cottony; lobules with spiny, margins a few spines longer and confined to the ends of lobules. Capitula solitary or fascicled, 1.5–3.6 cm across, peduncled or sessile. Outer involucral bracts narrow, terminating in spreading spines; inner bracts with dilated, scarious or spinescent tips. Florets c. 1.5 cm long, creamy-white, yellow or red.

Flowering and fruiting: July–September.

Distribution: Afghanistan, Pakistan, Karakorum, Himalaya from Kashmir to Bhutan, China.

Specimens examined: Beehama: 1650 m, roadsides, *G.H. Dar* 2167, Hanknar, Gund: 2000 m, *G.H. Dar* 8800.

Notes: A very variable species, having been divided into many varieties, only two of which are more often recognized: var. *wallichii* (leaves tomentose or cottony beneath) and var. *glabratum* (Hook.f.) Wendelbo (leaves ± glabrous beneath).

8. **JURINEA** Cass. in Bull. Sci. Soc. Philom. Paris 140. 1821.

Distributed in Europe and W. & C. Asia. Species *c*. 200, of which 1 occurs in Sind Valley.

Jurinea ceratocarpa (Decne.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 474. 1873; Hook.f., Fl. Brit. India 3: 378. 1881. *Saussurea ceratocarpa* Decne. in Jacquem., Voy. Inde 4: 93, t. 101. 1843 & in Walp., Repert. Bot. Syst. 2: 668. 1843; Hajra in Hajra & al., Fl. India 12: 194. 1995.

Perennial, scaberulous herb; stem 0 or erect, much-branched. Leaves linear-oblong or lanceolate, entire or pinnatifid, white-woolly beneath; upper leaves sessile, base auricled. Capitula sessile or terminating the branches, 2.5–3.8 cm across, bracteate by linear leaves. Involucral bracts lanceolate, acuminate, outer ones green, inner purple-tipped. Florets 1–1.5 cm long. Achenes 4 or 5-angled; angles thickened, ending in erect spines; pappus plumose.

Flowering and fruiting: July–September.

Distribution: W. Himalaya from Kashmir, Himachal Pradesh to Uttarakhand (Garwhal); W. Tibet.

Specimens examined: Baltal, rocky slopes, 2900–3000 m, *G.H. Dar* 4037, 4055; Nilnai: 3650 m, rocky slopes, *G.H. Dar* 7902; Hang, rocky slopes, 2600 m, *G.H. Dar* 8611; Sonamarg, *R.R. Stewart* 6601.

Notes: P. K. Hajra in Hajra & al., Flora India 12: 194. 1995 treats this species as *Saussurea ceratocarpa* Decne. and recognizes two varieties: var. *ceratocarpa* and var. *depressa* (C.B. Clarke ex Hook.f.) Lipsch., both occurring in the Kashmir Himalaya. *Jurinea dolomiaea* Boiss. also occurs in Kashmir, and is here treated under *Dolomiaea*.

9. **SAUSSUREA** DC., Ann. Mus. Natl. Hist. Nat. 16:156, 196. 1810, *nom. cons*.

Distributed in temperate Asia, Europe, W. and N. America and Australia (doubtfully native). Species 300–400, of these 61 species occur in India and 9 in Sind Valley.

Key to the species

1a.	Plants evidently densely woolly	2
1b.	Plants usually not densely woolly	3
2a.	Stems 15–30 cm; capitula crowded on flat dilated top of stem, concealed by woolly floral leaves	6. *S. gossypiphora*
2b.	Stems 5–15 cm; capitula not concealed by upper leaves	.9. *S. simpsoniana*
3a.	Plants stout; stems 0.3–3.5 m high	4
3b.	Plants not stout; stems 0.2–0.3 m high or absent	7
4a	Capitula sessile, usually in clusters	5. *S. costus*
4b.	Capitula peduncled, separated, in corymbs	5
5a.	Stem winged by decurrent leaf bases	3. *S. candolleana*
5b.	Stem not winged by leaf bases	6
6a.	Plants 0.5–1.6 m high; radical leaves present; cauline leaves usually few, lanceolate and smaller; capitula 2.5–4 cm across, long-pedunculate, laxly disposed	7. *S. heteromalla*
6b.	Plants usually 2–3 m high; radical leaves absent; cauline leaves oblong-lanceolate, sparsely denticulate; capitula 0.5–1 cm across, in narrow corymbs	1. *S. albescens*
7a.	Stems present; leaves obovate or lanceolate-acuminate	8
7b.	Stems absent; leaves broadly obovate or elliptic	2. *S. atkinsonii*
8a.	Leaves obovate; capitula in a dense terminal cluster, 8–10 mm across	4. *S. clarkei*
8b.	Leaves lanceolate-acuminate; capitula usually solitary, 3–4.5 cm across	8. *S. roylei*

1. **Saussurea albescens** (DC.) Sch.Bip. in Linnaea 19: 330. 1846; Hook.f., Fl. Brit. India 3: 374. 1881; Hajra in Hajra & al., Fl. India 12: 189. 1995. *Aplotaxis albescens* DC., Prodr. 6: 540. 1838.

Perennial, slender herb, to 1.25 m high; stem simple, erect, leafy. Leaves narrowly lanceolate, entire, toothed or pinnately lobed, acute or acuminate, rough above, usually white-tomentose beneath. Capitula numerous, in long-peduncled, branched, flat-topped clusters, erect, cylindrical, narrow, 1–2 × 0.5–1 cm. Involucral bracts rigid, tinged with purple. Florets pale pink. Achenes muricate; pappus white.

Flowering and fruiting: July–September.

Distribution: Afghanistan, Pakistan, W. & C. Himalaya from Kashmir to Nepal.

Specimens examined: Sonamarg, 2900 m, *G.H. Dar* 7754; Rayiol, 2200 m, maize fields, *G.H. Dar* 8633.

2. **Saussurea atkinsonii** C.B. Clarke, Compos. Ind.: 224. 1876; Hook.f., Fl. Brit. India 3: 367. 1881; Hajra in Hajra & al., Fl. India 12: 191. 1995.

Perennial scapose herb. Leaves spreading from the base, broadly obovate or elliptic, 4.5–11 x 2.5–5 cm, sessile or shortly petioled, membranous, toothed. Capitula solitary, sessile, 1.6–2.5 cm across, blue. Involucral bracts variable, scarious. Florets 1–1.2 cm long. Achenes glabrous; pappus scanty, scabrid.

Flowering and fruiting: August–September.

Distribution: Endemic to India: W. Himalaya from Kashmir, Himachal Pradesh to Uttarakhand.

Specimen examined: Sonamarg, *R.R. Stewart* 6642.

3. **Saussurea candolleana** Wall. ex DC., Prodr. 6: 541. 1838, pro syn. *S. candolleana* Wall. ex Sch.Bip. in Linnaea 19: 331. 1846; Hajra in Hajra & al., Fl. India 12: 193. 1995. *Aplotaxis candolleana* DC., Prodr. 6: 541. 1838; C.B. Clarke, Compos. Ind.: 230. 1876; Hook.f., Fl. Brit. India 3: 372. 1881.

Perennial, erect herb; stems deeply grooved, winged by the decurrent petioles or leaf bases. Leaves oblong or ovate-lanceolate, acute or acuminate, denticulate, glabrous above, usually white-tomentose beneath. Capitula cylindrical 1–2 cm across, short-peduncled, in dense terminal corymbs or clusters. Involucral bracts ovate, obtuse or acute. Florets 6–9 mm long, bluish-purple. Achenes narrow, angled, smooth; pappus short, scabrid.

Flowering and fruiting: July–September.

Distribution: Himalaya from Pakistan, through Kashmir, Himachal Pradesh, Uttarakhand, Nepal, Sikkim to Bhutan.

Specimens examined: Baltal, 3000 m, sandy slopes, *G.H. Dar* 3870; Pranshur, rocky slopes, among *Juniperus squamata,* 3400 m, *G.H. Dar* 7824.

4. **Saussurea clarkei** Hook.f., Fl. Brit. India 3: 372. 1881; Hajra in Hajra & al., Fl. India 12: 195. 1995.

Perennial, 10–15 cm high, stout, pubescent herb. Leaves sessile or with short winged petioles, obovate, membranous, acute, sharply toothed; finely pubescent on upper surface, cottony or glabrate beneath. Capitula in a dense terminal cluster, 8–10 mm across. Involucral bracts glabrous or pubescent; receptacle bristles exceeding the achenes. Pappus brown.

Flowering and fruiting: August–September.

Distribution: Endemic to the Kashmir Himalaya.

Specimen examined: Reported from Sonamarg by R.R. Stewart (1972).

5. **Saussurea costus** (Falc.) Lipsch. in Bot. J. URSS 49: 131. 1964; Hajra in Hajra & al., Fl. India 12: 196. 1995. *Aucklandia costus* Falc. in Annual Magaz. Natur. Hist. 6: 475. 1841.

Saussurea lappa (Decne.) Sch.Bip. in Linnaea 19: 331. 1846; Hook.f., Fl. Brit. India 3: 376. 1881; *Aplotaxis lappa* Decne. in Jacquem., Voy. Bot. 96, t. 104. 1853. *Kuth.*

Perennial, up to 2.5 m high, pubescent herb; stems stout, simple. Basal leaves very largely triangular, long-petioled; petiole lobately-winged; lamina up to 30 cm wide, membranous, irregularly lobed/toothed, scaberulous on upper surface, glabrate beneath; cauline leaves half-amplexicaul, sessile or shortly petioled. Capitula axillary or in terminal clusters of 2–6, subglobose, 2–3.8 cm across. Involucral bracts ovate-lanceolate, purplish. Florets dark purple. Achenes curved; pappus double, brown.

Flowering and fruiting: June–September.

Distribution: Pakistan and India: W. Himalaya from Kashmir through Himachal Pradesh to Uttarakhand.

Specimens examined: Sonamarg: *R. R. Stewart* 6314; *ibid*, shaded forest, 10.9.1975, *A. R. Azad* 1136; Zoji la, *R.R. Stewart* 18249.

Notes: An important W. Himalayan medicinal plant; it is cultivated in Himachal and Uttarakhand for its roots which are used as perfume, incense, insect repellant, and medicine.

6. **Saussurea gossypiphora** D. Don in Mem. Wern. Nat. Hist. Soc. 3: 414. 1821 & Prodr. Fl. Nepal: 168. 1825; Hook.f., Fl. Brit. India 3: 376. 1881; Hajra in Hajra & al., Fl. India 12: 200. 1995.

Saussurea gossypina Wall., 1831, nom. illeg.; *Aplotaxis gossypina* DC., 1838. *Jogipadsha.*

Perennial, densely woolly herb, appears like a snowball; stems 15–30 cm high, hollow throughout, simple, clavate, leafy, densely clothed with long, white or yellowish, matted wool. Leaves dense, sessile, linear, remotely toothed or runcinate-pinnatifid, embedded in very dense woolly hairs. Capitula usually numerous, cylindrical, densely crowded on flat dilated top of stem, concealed by woolly floral leaves, 1–2 cm long. Involucral bracts linear-oblong, shining. Florets purple, 1–2 cm long. Achenes narrowly obovoid, compressed, brown.

Flowering and fruiting: August–September.

Distribution: Alpine Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal Sikkim to Bhutan; S. Tibet.

Specimen examined: Pranshur: 4500 m, rocky cliffs at mountain top, *G.H. Dar* 7799.

Notes: Hajra (Fl. India 12: 201. 1995) has recognized 3 varieties of this species in India: vars. *lilliputa*, *gossipiphora* and *luxuriosa*; of these only the typical one is reported from Jammu & Kashmir, the other two occurring eastward in Nepal and eastern Himalaya.

7. **Saussurea heteromalla** (D. Don) Hand.-Mazz., Symb. Sin. 7: 1152. 1936; Hajra in Hajra & al., Fl. India 12: 202. 1995. *Cnicus heteromallus* D. Don, Prodr. Fl. Nepal.: 166. 1825.

Cirsium heteromallum (D. Don) Spreng., Syst. Veg. 3: 372. 1826; *Cnicus candicans* Wall., 1831, nom. nud.; *Aplotaxis candicans* DC., 1838; *Saussurea candicans* (DC.) Sch.Bip., 1846; Hook.f., Fl. Brit. India 3: 373. 1881.

Perennial erect herb; stems often branching near the top, cottony. Radical leaves in a rosette, oblong or obovate, shortly petioled, entire, sinuate-toothed or lyrate-pinnatifid, rough above, white-tomentose beneath; cauline leaves usually few, sessile, lanceolate, smaller. Capitula 2.5–4 cm across, long-peduncled, in large open-panicled corymbs. Involucral bracts 3–5-seriate, rigid, outer ones sharp-acuminate. Florets pale red, 1–2 cm long. Achenes angular, muricate; pappus white.

Flowering and fruiting: May–July.

Distribution: W. Afghanistan, N. Pakistan, subtropical and temperate northwest India and Himalaya from Salt Range, Hazara and Kashmir to Bhutan.

Specimens examined: Ganderbal, rocky slopes, 1800 m, *G.H. Dar* 1340; Bonzilla, Haripora, open slopes and rock crevices, 1900 m, *G.H. Dar* 5056.

Notes: It is a very variable species.

8. **Saussurea roylei** (DC.) Sch.Bip. in Linnaea 19: 330. 1846; Hook.f., Fl. Brit. India 3: 370. 1881; Hajra in Hajra & al., Fl. India 12: 210 1995. *Aplotaxis roylei* DC., Prodr. 6: 538. 1838.

Perennial, rather slender herb; stems thickened below the flower head. Basal leaves erect, lanceolate acuminate, entire or sinuate towards apex and pinnatifid towards base; cauline leaves few, sessile and semi-amplexicaul, overtopping the flower head, conspicuously white or not beneath. Capitula usually solitary, erect, dark purple, 3–4.5 cm across. Involucral bracts narrow lanceolate, straight, woolly-haired. Florets 1–1.5 cm long. Achenes smooth; pappus brownish.

Flowering and fruiting: July–September.

Distribution: Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to C. Nepal.

Reported from Sonamarg by R.R. Stewart (1972).

9. **Saussurea simpsoniana** (Field. & Gard.) Lipsch., Nov. Syst. Pl. Vasc. 1964: 319. 1966; Hajra in Hajra & al., Fl. India 12: 211. 1995. *Aplotaxis simpsoniana* Field. & Gard., Sert. Pl. t. 26. 1844.

Saussurea sacra Edgew. in Trans. Linn. Soc. London 20: 76. 1846; Hook.f., Fl. Brit. India 3: 376. 1881. Eng.: Sacred Saussurea; *Jogipadshah*/*Yogipadshah.*

Perennial, densely woolly herb; stem simple, 5–15 cm high, erect, cylindrical, clavate, hollow, base with persistent withered leaves. Cauline leaves sessile upwards, linear to narrowly oblong, obtuse or acute, coarsely toothed or shallowly lobed, woolly hairy. Capitula many, domed, 2–3.5 cm across, purple, exposed and not concealed by upper leaves, woolly outside. Involucral bracts 3 or 4-seriate, lanceolate. Achenes oblong, 2.5–4 mm long, 4 or 5-angled, smooth or rugulose; pappus double.

Flowering and fruiting: July–October.

Distribution: Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Sikkim, Tibet.

Specimens examined: Harmukh, 3636 m, 6.8.1971, *Mohd Ashraf* s.n. (KASH, Acc. Nos. 3372, 3408); Pir Panjal, Kashmir, ridge near the Sunset peak, south facing slope, 4200 m, florets purple-mauve, 9.9.1985, *Chadwell* & *Ramsay* 111 (KASH).

10. DOLOMIAEA DC., in Guill., Arch. Bot. 2: 330. 1833.

The genus *Dolomiaea* was first established by A. P. de Candolle as early as in 1833 on the basis of the Himalayan *Dolomiaea macrocephala* (Wall.) DC. Four decades after, it was not considered as different from *Jurinea* Cass. by Bentham and Hooker (Gen. Pl. 2: 474. 1873), a treatment followed by most of the botanists. However, *Dolomiaea* is now regarded as distinct from *Jurinea* (see Ling in *Acta Phytotax. Sin.* 10: 85–90. 1965; Susanna & Garcia-Jacas, Fam. Genera Vasc. Plants 8: 138). In fact, this genus is said to show perhaps closer affinity with *Saussurea* DC. rather than with *Jurinea*.

Distributed chiefly in Tibet and the Himalaya. Species *c.* 14, of which 2 species are reported from Sind Valley.

Key to the species

1a. Leaves ovate to elliptic-ovate, 5–10 x 3–7 cm, entire or very shallowly lobed and toothed; capitula 7–24, with up to 4.5 cm long peduncles; inner involucral bracts appressedly pubescent; corolla ± 2 cm long; achenes nearly smooth 1. *D. baltalensis*

1b. Leaves oblong-lanceolate, 15–45 x 3.5–18 cm, pinnately lobed, lobes further lobulate or toothed; capitula 3–30, sessile or very short peduncled; inner involucral bracts scabrid or smooth; corolla 2.5–3 cm long; achenes tubercled 2. *D. macrocephala*

1. **Dolomiaea baltalensis** Dar & Naqshi, J. Bombay Nat. Hist. Soc. 87: 278, f. 3 A–C. 1990; Hajra in Hajra & al., Fl. India 12: 226. 1995.

Perennial, acaulescent herb. Leaves radical, petiolate; petioles 3–10 cm long, flattened, ± sheathing at base, channelled, woolly; lamina ovate to elliptic-ovate, slightly cordate, cuneate or somewhat rounded at base, 5–10 x 3–7 cm, entire or very shallowly and irregularly lobed, spinulosely dentate, densely woolly on upper surface, densely white-tomentose beneath. Capitula corymbose, 7–24, homogamous, discoid, oblong, up to 4 cm long, expanded above after anthesis; peduncles stout, 0.5–4.5 cm long, channelled, woolly. Involucral bracts multiseriate, imbricate, serrulate; outer bracts ovate-lanceolate, often woolly at least basally, appressedly hairy towards apices; inner bracts lanceolate to oblong-lanceolate, long-acuminate, scarious, longer than outer ones, appressedly pubescent, more so in apical half. Florets actinomorphic, bisexual; corolla purple, tubular, tube slender, 1 cm long, limb inflated and 5-partite; anther bases sagittate with ciliate-lacerate, c. 2 mm long tails. Achenes cuneate-obovoid, 5–7 mm long, indistinctly 4-angled, often slightly curved, ashy grey with irregular transverse black streaks, smooth and shining, apex prominently rimmed and umbonate. Pappus 2–3- or multi-seriate, brown, deciduous; hairs unequal, barbellate, cohering at the base into a ring.

Flowering and fruiting: August–September.

Distribution: Kashmir Himalaya.

Specimens examined: Baltal, Sonamarg, on rocky slopes, 3000 m, 2.9.1982, *G.H. Dar* 3899 (holotype, KASH; isotypes KASH, K, E); Pranshur, Sonamarg, 3500 m, rocky slopes above the meadowland, 27.8.1983, *G.H. Dar* 8325 (paratypes, KASH, K, E).

Notes: Hajra (in Hajra & al., Fl. India 12: 226. 1995) considers this species as a variant of *Jurinea macrocephala (Jurinea dolomiaea)* [= *Dolomiaea macrocephala*]. The two species, however, are quite distinct in the size, shape and lobing of their leaves, length of peduncles and corollas, and in the surface of achenes, as shown in the key above.

2. **Dolomiaea macrocephala** (Wall.) DC. in Guill., Arch. Bot. (Paris) 2: 330. 1833; Royle, Ill. Bot. Himal. 251. t. 57. 1835; DC., Prodr. 6 : 542. 1838. *Carduus macrocephalus* Wall. Cat. 100, n. 2904. 1831, *nom nud.*

Jurinea macrocephala (Royle) C.B. Clarke, Compos. Ind.: 237. 1876, *non* DC., 1838; Hook.f., Fl. Brit. India 3: 378. 1881; *J. dolomiaea* Boiss., Fl. Or. Suppl. 311. 1888; Hajra in Hajra & al., Fl. India 12: 183. 1995; *J. himalaica* sensu R.R. Stewart, Cat. Vas. Plants W. Pak. & Kash.: 757. 1972; *Jurinella macrocephala* (Royle) Aswal & Goel in Indian J. Forest. 11(4): 339. 1988.

Perennial acaulescent herb, with a woody rootstock. Leaves oblong-lanceolate in outline, larger, 15–45 x 3.5–18 cm, pinnately lobed; lobes broad, further lobulate or toothed, often with purple mid-veins. Capitula 3–30, up to 4 cm long and 1.5–2.5 cm across, sessile or very shortly pedunculate. Involucral bracts 2–3.5 cm long; outer bracts ovate-lanceolate; inner ones elliptic-lanceolate, long-acuminate, dark red, scabrid or smooth, erect, scarious. Corolla 2.5–3 cm long; style branches long. Achenes cuneate-obovoid, 6–8 mm long, compressed, curved, unequally 4–5-angled, truncate, tubercled. Pappus brown, *c.* 2.5 cm long, copious, cohering at the base into a ring.

Flowering and fruiting: July–September.

Distribution: Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to E. Nepal.

Specimen examined: Yamhar Pass, Sonamarg, fide *R. R. Stewart*: 757. 1972.

Uses: It is an important medicinal plant, locally called as *Dhup*, with its roots being used as incense.

11. CARTHAMUS L., Sp. Pl.: 830. 1753; Gen. Pl. ed. 5: 361. 1754.

Distributed in the Mediterranean region, Central Asia, Caucasus and Iran. Species c. 20, of which 1 species in Sind Valley.

Carthamus lanatus L., Sp. Pl.: 830. 1753; Hook.f., Fl. Brit. India 3: 386. 1881; Hajra in Hajra & al., Fl. India 12: 162. 1995.

Annual, very rigid herb; stems erect, strict. Leaves spreading, hard, spinescent: radical leaves lyrate-pinnatifid, spinose-dentate; cauline leaves ovate, half-amplexicaul, with an auricled toothed base, strongly 3-veined. Capitula 2–3.5 cm across, pale yellow. Outer involucral bracts far exceeding the florets, leafy, spinescent along the sides; inner ones entire, scarious. Achenes 5–6 mm long, thick, very broad, turbinate, obtusely 4-angled; pappus longer than the achenes, unequal.

Flowering and fruiting: July–September.

Distribution: Europe, Mediterranean region, Iran, Afghanistan, Pakistan, and Kashmir to Uttarakhand.

Specimen examined: Ganderbal: 1650 m, on mud walls, *G.H. Dar* 2560.

Notes: A second species, *Carthamus oxyacantha* M. Bieb, is also reported from Kashmir. It differs from the above-cited species mainly in lacking pappus.

12. CENTAUREA L., Sp. Pl.: 917. 1753; Gen. Pl. ed. 5: 389. 1754.

Distributed in Europe, W. Asia, Equatorial Africa and (doubtfully) Australia. Species c. 250, of which 1 species occurs in Sind Valley.

Centaurea iberica Trev. ex Spreng., Syst. Veg. 3 :406. 1826; Hook.f., Fl. Brit. India 3: 385. 1881; Hajra in Hajra & al., Fl. India 12: 165. 1995. *Kretchi Kond.*

Biennial, divaricately much-branched herb; branches ± rigid, angular, erect or spreading from the base. Leaves spreading: radical ones pinnately lobed; lobes distant, ovate to linear-lanceolate, toothed; middle cauline leaves few-lobed; upper ones lanceolate, entire. Capitula ovoid, subsessile, lateral and terminal, 1–2 cm across, surrounded by upper leaves. Involucral bracts with narrow, membranous margins, terminating in a long, strong, spreading spine with short lateral spines at its base. Disc-florets only present, purplish-pink or white, glandular. Achenes 2–3 mm long, with a very short pappus.

Flowering and fruiting: July–September.

Distribution: S. E. Europe, W. Asia, Afghanistan, C. Asia, Pakistan to Kashmir.

Specimen examined: Beehama: 1650 m, roadsides, *G.H. Dar* 2171.

13. **TRICHOLEPIS** DC. in Arch. Bot. (Paris) 2: 515. 1833.

Distributed in C. Asia, Afghanistan, Pakistan, India, Nepal and Myanmar. Species *c.* 20, 1species occurs in Sind Valley.

Tricholepis furcata DC., Prodr. 6: 563. 1838; C.B. Clarke, Compos. Ind.: 238. 1876; Hook.f., Fl. Brit. India 3: 380. 188; Hajra in Hajra & al., Fl. India 12: 222. 1995.

Perennial slender herb, branched from the base. Leaves simple, elliptic to lanceolate, smooth-scaberulous on upper surface, pubescent beneath, margin denticulate, apex acute-acuminate. Capitula nodding, 3–3.5 cm across, on long peduncles. Involucral bracts ± filiform, ciliate, recurved with black tips, spreading in fruit. Corolla yellow. Achenes compressed, ribbed, smooth. Pappus hairs white, very slender, connate basally, scabrid, inner much longer than achene body.

Distribution: Pakistan, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, through Nepal, Sikkim to Bhutan.

Specimen examined: Reported from Baltal in Sind Valley by *T. Thomson* (fide *R. R. Stewart*, 1972).

Notes: Four other species reported from Jammu & Kashmir are: *Tricholepis elongata* DC., *T. karensium* Kurz, *T. stewartei* C.B. Clarke, and *T. tibetica* Hook.f. & Thomson.

IV. **Subfamily Cichorioideae** (Juss.) Chevall., Fl. Gén. Env. Paris 2(2): 513. 1828.

This subfamily comprises c. 240 genera with *c.* 2900 species; represented in our area by 18 genera with 37 species, belonging to 1 tribe, Cichorieae.

Tribe Cichorieae Dumort., 1829 (syn. Lactuceae Cass., 1819).

Distributed in temperate regions of the northern hemisphere, also in tropical and subtropical parts of S. America, Africa, Asia and Australia. It comprises 93 genera with *c.* 2170 species (plus *c.* 7500 apomictic microspecies); represented in Sind Valley by 18 genera with 37 species.

14. **CHONDRILLA** L., Sp. Pl.: 796. 1753; Gen. Pl. ed. 5: 348. 1754.

Chiefly European, Mediterranean and Oriental, the genus comprises *c.* 25 species, of which 1 occurs in Sind Valley.

Chondrilla setulosa C.B. Clarke in Hook.f., Fl. Brit. India 3: 402. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 266. 1995.

Perennial, quite glabrous herb; stems much-branched from the base; branches very slender. Radical leaves pinnatifid; cauline leaves linear, very narrow, margins with sparse, minute spines. Capitula cylindric, 1.2–1.5 cm long, about 8-flowered, hoary. Outer involucral bracts ovate-obovate, glabrous; inner bracts linear or linear-lanceolate, somewhat longer than outer ones, each with a stout spinulose midrib, thickening in fruit. Ligules yellow. Achenes oblong, slender, strongly toothed below the very slender beak which almost equals the body, muricate.

Flowering and fruiting: June–August.

Distribution: Baltistan, Gilgit, Chitral, Astor, Kashmir.

Specimen examined: Wusan, Prang, 1750 m, sandy slopes on roadsides, *G.H. Dar* 3783.

Notes: Endemic from Chitral to Kashmir, this is a rare species. Mamgain & Rao (Fl. India 12: 267. 1995) erroneously report it to be known only by type collection, not noticing its other collections as mentioned by R.R. Stewart in his catalogue of vascular plants of Pakistan and Kashmir (1972: 730).

15. CREPIS L., Sp. Pl.: 805. 1753 & Gen. Pl. ed. 5: 350. 1754.

Chiefly distributed in N. temperate regions of the Old World, some species occur in America. Species c. 200, of these 3 species are reported from Sind Valley.

Key to the species

1a. Annual, non-rhizomatous; achenes trimorphic, ± winged 3. *C. sancta*
1b. Perennial, rhizomatous herbs; achenes monomorphic, not winged 2

2a. Stem stout; cauline leaves distinct; capitula 7–13 mm across; pappus 7–9 mm long 1. *C. kashmirica*
2b. Stem slender; cauline leaves not distinct; capitula 2–3 mm across; pappus 4–5 mm long 2. *C. multicaulis*

1. **Crepis kashmirica** Babc. in Univ. Calif. Publ. Bot. 14. no. 13: 328. 1928; Mamgain & Rao in Hajra & al., Fl. India 12: 230. 1995. *C. blattarioides* Hook.f., Fl. Brit. India 3: 394.1881, non Vill.

Perennial herb with woody rhizome. Stem stout, striate, branched apically. Radical leaves slender, simple; cauline leaves usually with basally winged and clasping petiole, oblanceolate, obtuse, toothed. Capitula campanulate, erect, 7–13 mm across, densely hairy. Involucral bracts 2-seriate; outer bracts about half the number of inner ones. Ligules yellow. Achenes fusiform, ± attenuate towards ends, many-ribbed; pappus 7–9 mm long, persistent.

Flowering and fruiting: July–September.

Distribution: Tibet, Northwest Himalaya from Kashmir to Himachal Pradesh.

Specimens examined: Sonamarg, C.B. Clarke 30806 A, C, D; R. R. Stewart 6823 & 7333.

2. **Crepis multicaulis** Ledeb., Fl. Altaic. 4: 125. 1833; Mamgain & Rao in Hajra & al., Fl. India 12: 230. 1995.

C. multicaulis subsp. *genuina* (Regl.) Babc. in Univ. Calif. Publ. Bot. 19: 401. 1941

Perennial herb, with short rhizome; stem slender, striate, glabrous or hirsute-pubescent. Leaves looking all radical, petioled, narrowly obovate-spathulate, lyrate-pinnatifid or sinuate-toothed, pubescent on both surfaces; cauline leaves few, very small and bract-like. Capitula cylindric, on erect, ± corymbosely branched, naked and glandular peduncles, 7–12 x 2–3 mm. Involucral bracts 2-seriate; the outer bracts minute and ± ovate, inner ones ± linear and obtuse. Ligules yellow, puberulous. Achenes very slender, distinctly narrowed upwards from the middle, finely-ribbed; pappus 4–5 mm long, persistent.

Mamgain & Rao (Fl. India 12: 230. 1995) have recognized two subspecies as follows:

a. Stems glabrous or sparsely pubescent; inflorescence lax 2.2 ssp. *multicaulis*
b. Stems densely glandular-pubescent; inflorescence congested 2.1 ssp. *congesta*

2.1 **Crepis multicaulis** Ledeb. subsp. **congesta** (Regl.) Babc. in Univ. Calif. Publ. 19: 401. 1941.

C. stoliczkae C.B. Clarke, Compos. Ind.: 255. 1876; Hook.f., Fl. Brit. India 3: 396.1881.

Flowering and fruiting: July-September.

Distribution: China, Pakistan, Northwest Himalaya from Kashmir to Himachal Pradesh.

Specimen examined: Pranshur: 3400 m, rocky slopes, among juniper patches, *G.H. Dar* 7877.

2.2 **Crepis multicaulis** Ledeb. subsp. **multicaulis**

Flowering and fruiting: July–September.

Distribution: China, Tibet, Turkey, Norway, Northwest Himalaya from Kashmir to Himachal Pradesh.

Specimen examined: Sonamarg, *R. R. Stewart* 6416.

3. **Crepis sancta** (L.) Babc. in Univ. Calif. Publ. 19: 403. 1941; Mamgain & Rao in Hajra & al., Fl. India 12: 233. 1995. *Hieracium sanctum* L., Cent. Pl. 2: 30. 1756.

Trichocrepis bifida Vis., Stirp. Dalm. Rar.: 18, t. 19. 1826*; Pterotheca falconeri* Hook.f., Fl. Brit. India 3: 399. 1881; *Lagoseris sancta* subsp. *bifida* (Vis.) Thell., 1911; *Crepis sancta* ssp. *bifida* (Vis.) Babc. 1947.

Annual, scapigerous; stem simple or branched above, swollen, hairy or not. Radical leaves usually subsessile, obovate or elongate-spathulate, lyrate, sinuate-toothed or pinnatifid; cauline leaves few, very small, bract-like. Capitula broadly cylindric, on leafless upwardly subcorymbosely-branched peduncles, *c.* 1 cm long. Involucral bracts 2-seriate; outer bracts very small, usually ovate; inner ones linear, acute, midrib thickened in fruit. Ligules yellow, may be tinged red on outside. Achenes trimorphic, slender, terete to subterete, narrowed above, finely-ribbed; pappus soft, white.

Flowering and fruiting: April–July.

Distribution: Turkey, Syria, Arabia, Palestine, Afghanistan, Pakistan, and Himalaya from Kashmir through Himachal Pradesh, Uttarakhand, to Nepal.

Specimens examined: Sarich, 1700 m, wastelands, *G.H. Dar* 731; Tulmulla, 1650 m, mud walls, *G.H. Dar* 1305; Panzingam, 1900 m, roadsides, *G.H. Dar* 3640; Sarich, 1700 m, banks of Power House Canal, *G.H. Dar* 4547.

16. **DUBYAEA** DC., Prodr. 7: 247. 1838.

Endemic to the Sino-Himalayan Region, it comprises c. 14 species, 1 of which occurs in Sind Valley.

Dubyaea oligocephala (Sch.Bip.) Stebbins in J. Bot. 75: 17. 1937; Mamgain & Rao in Hajra & al., Fl. India 12: 277. 1995. *Paleya oligocephala* Sch.Bip. in Jahresber. Pollichia 22–24: 320. 1866.

Perennial herb, up to 1.5 m high. Basal leaves oblanceolate to obovate, lyrate-pinnatifid or only dentate; cauline leaves usually few, lanceolate, smaller upwards. Capitula 2–6, on cymose peduncles, erect. Involucral bracts many-seriate; outer bracts ± deltoid, strong-ciliate, inner ones lanceolate. Ligules yellow. Achenes fusiform, 5–10 mm long; pappus deciduous at maturity.

Distribution: Western Himalaya from Jammu & Kashmir to Himachal Pradesh.

Specimens examined: Sonamarg: *R. R. Stewart* 6404, 6777 and 12381 (cited in R. R. Stewart, 1972).

Notes: *Dubyaea oligocephala* grows in open rocky/gravelly places from 2000 to 3000 m. A second species from India, also reported from Jammu & Kashmir, is *D. hispida* (D. Don) DC.

17. **IXERIS** (Cass.) Cass. in Cuvier, Dict. Sci. Nat. 25: 623. 1822.

Distributed in Asia from Malaysia to Japan. Species *c*. 10, of these 1 species occurs in Sind Valley.

Ixeris polycephala Cass. in Cuvier, Dict. Sci. Nat. 24: 50. 1822; Mamgain & Rao in Hajra & al., Fl. India 12: 279. 1995.

Ixeris fontinalis DC., Prodr. 7: 151. 1838; *Lactuca polycephala* (Cass.) Benth. & Hook. f. in Gen. Pl. 2 : 526. 1873; C.B. Clarke, Compos. Ind.: 272. 1876; Hook.f., Fl. Brit. India 3: 410. 1881.

Annual flaccid, glabrous. Leaves variable, membranous; radical leaves petioled, very long, narrow linear or lanceolate, entire, rarely pinnatifid; cauline leaves sessile, oblong or lanceolate, base sagittate, auricles acute. Capitula in dichotomous or subumbellate corymbs or panicles, 3–5 mm across; peduncle erect. Outer involucral bracts ovate; inner ones ± linear, longer. Ligules yellow. Achenes elliptic-lanceolate, strongly ribbed, narrowed into short, slender, brown beak; pappus white, as long as the achene body.

Flowering and fruiting: April–May.

Distribution : Afghanistan, China, Pakistan; Himalaya from Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Sikkim; N. and NE India in Punjab, Assam, West Bengal, Manipur, Nagaland, Meghalaya and Bihar; extending to Myanmar and Japan.

Specimens examined: Beehama, 1650 m, vegetable fields, *G.H. Dar* 741; Shallabugh, 1600 m, along water courses, *G.H. Dar* 1007.

18. **LAPSANA** L., Sp. Pl.: 811. 1753; Gen. Pl. ed. 5:353. 1754.

Monospecific (some species previously in *Lapsana* are now treated in *Crepis* and *Lapsanastrum*); the single species is distributed in tropical, subtropical and temperate regions of Europe and Asia incl. India.

Lapsana communis L., Sp. Pl.: 811. 1753; Hook.f., Fl. Brit. India 3: 392.1881; Mamgain & Rao in Hajra & al., Fl. India 12: 333. 1995.

Annual; stems erect, paniculately branched, leafy. Leaves alternate, membranous; radical leaves petioled, lyrate, sinuate-toothed; cauline leaves ovate, the uppermost linear, entire. Capitula corymbose, many-flowered, cylindrical, small; peduncle short, slender, erect. Outer involucral bracts ± ovate, rigid, keeled, obtuse; inner ones linear-lanceolate, acute. Ligules yellow. Achenes ± compressed, 3–5 mm long, shining.

Flowering and fruiting: July–September.

Distribution: Europe, N. Africa, N. & W. Asia, W. Himalaya from Pakistan to Kashmir.

Specimen examined: Naranag, 2300 m, forest floor, *G.H. Dar* 4299.

19. **SOROSERIS** Stebbins in Mem. Torrey Bot. Club 19(3): 27. 1940.

Endemic to the Sino-Himalayan Region, this genus comprises *c*. 8 species, of which 1 species occurs in Kashmir Himalaya.

Soroseris deasyi (S. Moore) Stebbins in Mem. Torrey Bot. Club 19(3): 36, t. 10e, f. 1940; Mamgain & Rao in Hajra & al., Fl. India 12: 236. 1995. *Lactuca deasyi* S. Moore in J. Bot. 38: 424. 1900.

Crepis glomerata Hook.f., Fl. Brit. India 3: 398. 1881, p.p. (non *Prenanthes glomerata* Decne.).

Perennial herb, up to 10 cm high; stems largely subterranean and rhizomatous, flowering stem thick and hollow. Leaves small, up to 2 cm long; lower cauline leaves petiolate, spathulate-obovate or oblong, 3-veined, margin undulate or toothed, apex obtuse; upper cauline leaves linear, ± woolly hairy. Capitula many, crowded in a cymose inflorescence, 1–1.5 cm long, ligulate, each with 4 florets; peduncles very short. Involucral bracts 2-seriate; outer bracts 2, shorter or longer than the inner 4 bracts. Ligules yellow, 5-toothed. Achenes narrowly obovate; pappus pale white, about twice the length of achene body.

Flowering and fruiting: July–September.

Distribution: China (Sinkiang), Pakistan, Himalaya (Jammu & Kashmir, Punjab, Nepal).

Specimen examined: Sind Valley: Zojibal, *Cov.* 928 (fide *R. R. Stewart*, 1972).

Notes: This species grows on rocky/gravelly slopes from 3500–4600 m.

20. **TARAXACUM** W.W. Weber in F.H. Wigg., Prim. Fl. Holsat.: 56. 1780, nom. cons.

Having its origin in the northwestern Himalaya, E. Turkestan and Pamir mountains, *Taraxacum* is an exceedingly variable genus, with numerous apomicts, which have been described as species by many authors. More than 1000 of these species have been named, chiefly in the cold and temperate regions, and many more can be found.

Hooker f. (Fl. Brit. India 3: 401. 1881) has reported 2 species and 4 varieties from the British India, while J. L. van Soest (*Wentia* 10: 1–91. 1963) reported 75 species under 12 sections from India. However, until a more satisfactory biosystematic treatment of the whole genus is available, all the forms reported from our area are here included under *T. officinale* complex.

Taraxacum officinale W.W. Weber ex F.H. Wigg., Prim. Fl. Holsat.: 56. 1780; Hook.f., Fl. Brit. India 3: 401. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 252. 1995. *Handh.*

Perennial, scapigerous herb, with rhizomatous rootstock. Leaves all radical, sessile, spreading, usually narrowly oblong or oblanceolate, irregularly pinnatifid; lobes linear or triangular, acute, toothed. Capitula solitary, on hollow, fleshy scapes, 1–2 cm across. Outer involucral bracts ± ovate, much shorter than ± linear inner ones, erect, margin often white, tips usually thickened or hooked; receptacle flat, naked. Ligules yellow. Achenes flattened, abruptly narrowed to a long beak, ribbed, glabrous, minutely spiny in the upper half; pappus whitish, simple, unequal.

Flowering and fruiting: March–October.

Distribution: W. Tibet; throughout the Himalaya from Jammu & Kashmir, Himachal Pradesh, Punjab, Uttarakhand to Nepal; Meghalaya, W Ghats.

Specimens examined: Beehama: 1700 m, foothills, *G.H. Dar* 341; Ganderbal: 1800 m, grassy slopes, *G.H. Dar* 346; Doderhama: 1650 m, roadsides, *G.H. Dar* 1890; Sarich: 1700 m, open slopes, *G.H. Dar* 4539; Tulmulla: 1650 m, *G.H. Dar* 4543; Wayil: 1725 m, roadsides, *G.H. Dar* 4594; Sarbal: 2750 m, meadowlands, *G.H. Dar* 5653.

Use: It is locally used as a favourite vegetable, especially fed to women after delivery in rural areas.

Notes: Based on van Soest's work and other literature, R. R. Stewart (1972) lists the following additional taxa from Sind Valley:

Taraxacum aereum van Soest (Sonamarg, *Stewart* 9805, p.p.); *T. aurorum* van Soest (Sonamarg, *Stewart* 9806 a, p. p.); *T. himalaicum* van Soest f. *kuluense* van Soest (Sonamarg, *Srivastava*, s.n.); *T. indicum* Hand.-Mazz. (Sonamarg, *Stewart* 367a); *T. kashmirense* van Soest (Vishansar, Yamhar Pass); *T. nivale* J. Lange (Lohan Gali beyond Gangabal Lakes, *Stewart* 18480); *T. pseudo-stenolepinum* van Soest (Sonamarg, *Stewart* 9831, type); and *T. tenebristylum* van Soest (Sonamarg, *Stewart* 9799).

21. **YOUNGIA** Cass. in Ann. Sci. Nat. (Paris) Ser. 1. 23: 88. 1831.

Distributed from the Himalaya eastward to Japan, the genus was treated with *Crepis* in the Fl. Brit. India. Species c. 35, of which 3 species are reported from Sind Valley.

Key to the species

1a.	Perennial herbs; loosely branched above; achenes conspicuously beaked, almost equalling the pappus	3. *Y. tenuifolia*
1b.	Annual; densely branched above; achenes not or hardly beaked, shorter or longer than the pappus	2
2a.	Leaves nearly all radical; capitula 5–8 mm long; achenes 2–3 mm long, shorter than the pappus	2. *Y. japonica*
2b.	Radical leaves few; capitula 10–14 mm long; achenes 4–6 mm long, longer than the pappus	1. *Y. glauca*

1. **Youngia glauca** Edgew. in Trans. Linn. Soc. London 20: 79. 1846; Mamgain & Rao in Hajra & al., Fl. India 12: 327. 1995.

Barkhausia flexuosa DC., Prodr. 7: 156. 1838; *Crepis flexuosa* (DC.) Benth., Gen. Pl. 2: 515. 1873; C.B. Clarke, Compos. Ind.: 254. 1876; *C. glauca* Benth., Gen. Pl. 2: 515. 1873; Hook.f., Fl. Brit. India 3: 394. 1881.

Annual, glabrous; stems densely corymbosely branched above. Radical leaves few, long-petioled, obovate-spathulate, sinuate-toothed to pinnate, with acutely cut lobes; cauline leaves sessile, linear, entire. Capitula mostly terminal, on slender naked peduncles, narrow, 1–1.4 cm long, few-flowered. Outer involucral bracts minute. Ligule yellow. Achenes 4–6 mm long, slender, hardly beaked, obscurely scabrid; pappus white, shorter than achenes.

Flowering and fruiting: July–September.

Distribution: C. Asia, China, Tibet, Himalaya from Kashmir through Himachal Pradesh, Uttarakhand to C. Nepal.

Specimen examined: Zojila, *R.R. Stewart* 7489.

2. **Youngia japonica** (L.) DC., Prodr. 7: 194. 1838; Mamgain & Rao in Hajra & al., Fl. India 12: 329. 1995. *Prenanthes japonica* L., Mant. Pl. 1: 107. 1767.

Crepis japonica (L.) Benth., Fl. Hongk.: 194. 1861; Hook.f., Fl. Brit. India 3:395.1881; *Youngia japonica* subsp. *genuina* (Hochr.) Babc. & Stebbins, 1937.

Annual, glabrous, smooth; stems often tufted, erect, slender, hollow, branches spreading. Leaves nearly all radical, rosulate, obovate-oblanceolate, membranous, usually pinnatifid; lobes toothed, terminal one the largest; cauline leaves few and smaller. Capitula in terminal corymbs, many-flowered, 5–8 × 3–6 mm. Involucral bracts narrowly oblong, green. Ligules yellow; stigma bifid, bluish, exserted. Achenes flattened, 2–3 mm long, finely ribbed, not beaked; pappus white, longer than achenes.

Flowering and fruiting: April–June.

Distribution: China, Afghanistan, Pakistan; Himalaya from Kashmir, Himachal Pradesh, Punjab, Uttarakhand, Nepal to Bhutan; Malaysia, Sri Lanka, Hawaii, Philippines, Japan and Korea.

Specimens examined: Saloora, 1635 m, roadsides, *G.H. Dar* 1018; Sarbal, 2750 m, sandy slopes, *G.H. Dar* 5623.

3. **Youngia tenuifolia** (Willd.) Babc. & Stebbins in Carn. Inst. Wash. Publ. 484: 46. f. 9–12. 1937; Mamgain & Rao in Hajra & al., Fl. India 12: 331. 1995. *Crepis tenuifolia* Willd., Sp. Pl. 3: 1605. 1803.

Youngia tenuifolia subsp. *diversifolia* (Ledeb. ex Spreng.) Babc. & Stebbins, l. *c*. 54, t.12, f. k–q; *Prenanthes diversifolia* Ledeb. ex Spreng, 1826; *Youngia diversifolia* (Ledeb. ex Spreng.) Ledeb., 1846.

Perennial herb with woody rootstock; stems many from the base, stout, branched. Radical leaves long-petioled, divided into many deeply-pinnatifid lobes; cauline leaves pinnatifid, the uppermost ones sessile and linear. Capitula many, corymbosely crowded on minutely-bracteate peduncles, 1–1.6 x 0.5–0.7 cm. Outer involucral bracts much shorter than the inner ones. Ligules yellow. Achenes oblanceolate, conspicuously beaked, 4.5–6 mm long; pappus silvery, almost as long as achenes.

Flowering and fruiting: July–September.

Distribution: Turkestan, China, Tibet; Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Assam.

Specimens examined: Zojila, rock crevices, *R.R. Stewart* 7170, 12386; Sarbal, 2700 m, shady slopes, 7.8.1974, *U. Dhar* 854 (KASH).

22. **CICERBITA** Wallr., Sched. Crit. 433. 1822.

Cephalorrhynchus Boiss. Diagn. Pl. Orient. Ser. 1, 4: 28. 1844.

The genus has been treated variously, some authors having adopted a narrow view (separating *Cephalorrhynchus* as a distinct genus, e.g. Lack in Fam. Gen. Vasc. Plants 8: 187. 2007) with a few species, while others accept it in a broader sense and recognize many species. Based on a broader circumscription, Kilian & al., in Funk & al., (eds.). Syst. Evol. Biogeog. Comp. Cichorieae, 344–383. 2009, have assigned *c*. 35 species to this genus. 6 species occur in Sind Valley.

Key to the species

1a.	Plants stemless, scapigerous	2. *C. astorensis*
1b.	Plants with stems, not scapigerous	2
2a.	Involucral bracts in 2 series	3
2b.	Involucral bracts in 3 or 4 series	4
3a.	Florets 5 in a capitulum; achenes brown, 7.5–13 mm long, including a concolorous beak 1.5–3 mm long	6. *C. rapunculoides*
3b.	Florets 6–8 in a capitulum; achenes blackish-brown, 7–10.5 mm long, including a ± discolorous (white) beak 2–2.5 mm long	3. *C. decipiens*
4a.	Capitulum with 6–8 florets	3. *C. decipiens*
4b.	Capitulum with 10–30 florets	5

5a. Stem up to 10 mm broad at base; radical leaves 3–5 cm broad, unlobed, sharply toothed; inner pappus 10–12 mm long 1. *C. alii*
5b. Stem 3–5 mm broad at base; radical leaves 1–3 cm broad, entire or lobed; inner pappus 4–7 mm long 6

6a. Capitulum with 10–15 florets; involucral bracts 12–15; achenes ± black, 4.5–5.5 x 1 mm, with c. 1.5 mm long pale beak; inner pappus 6–7 mm long, snowy white 5. *C. macrorhiza*
6b. Capitulum with 24–30 florets; involucral bracts 20–22; achenes brown, 6–8 x 1.5 mm, with 1.5–2 mm long, creamish-yellow beak; inner pappus 4–6 mm long, pale white 4. *C. lessertiana*

1. **Cicerbita alii** Roohi Bano & Qaiser in Pakistan J. Bot. Spl. Issue 42: 39, f. 3. 2010.

Perennial herb; stems rigid, up to 10 mm broad at base. Radical leaves sessile to subsessile, semiamplexicaul, broad elliptic to oblanceolate, unlobed, sharply denticulate-serrulate, acuminate to mucronate, ± hispid beneath; cauline leaves smaller. Capitula in terminal fascicles, peduncled, campanulate, 1.5–2.5 cm long, many-flowered. Involucral bracts 3-seriate, blackish; outermost bracts ovate-lanceolate, about half the length of linear-oblong innermost ones. Ligules bluish-purple or mauve. Achenes ± cylindrical to oblanceolate, 5–7 x 2 mm, greyish-black, with wavy ribs and margin, densely hairy; beak 2 mm long, concolorous; pappus snowy white.

Flowering and fruiting: July–September.

Distribution: Pakistan (Gilgit) and Kashmir.

Note: It was described from Kolahoi Valley, Kashmir, by Roohi Bano & Qaiser (2010).

2. **Cicerbita astorensis** Roohi Bano & Qaiser in Pakistan J. Bot. Spl. Issue 42: 37, f. 1. 2010.

Perennial, small, acaulescent, scapigerous herb. Basal leaves rosulate, sessile to subsessile, linear-oblanceolate, usually entire, acuminate, glabrous. Capitula solitary, terminal, campanulate, 1.5–2.0 cm long, long-peduncled, many-flowered, villous. Involucral bracts 3-seriate; outermost bracts lanceolate, shorter than the linear-oblong inner ones. Ligules blue to purplish. Achenes ellipsoid, brown; beak 2 mm long, pale or cream; pappus biseriate, dirty white.

Flowering and fruiting: July–September.

Distribution: Pakistan (Chitral and Gilgit) and Kashmir.

Specimen examined: Mengandob, 3600 m, 6.9.1956, *O. Polunin* 56/717g (BM).

3. **Cicerbita decipiens** (C.B. Clarke) P. Beauv., Bull. Soc. Bot. Gen. 2(2): 127. 1910. *Lactuca decipiens* C. B. Clarke, Compos. Ind.: 266. 1876; Hook.f., Fl. Brit. India 3: 407. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 288. 1995.

Perennial, glabrous to puberulous herb; stem tall, paniculately branched above. Radical leaves subsessile to shortly petioled with winged base, runcinate-pinnatifid with backward pointing, coarsely-toothed lobes, the terminal lobe broadly hastate; cauline leaves with winged petioles, dilated and auricled at base, ± lyrate-pinnatilobate; uppermost lanceolate. Capitula on thin bracteate ± racemose peduncles, cylindrical, 1.2–2.0 cm long, drooping, glabrous, 6–8-flowered. Involucral bracts 2 or 3-seriate, papillose outside, unequal - outermost bracts shorter than the middle ones which, in turn, are shorter than the innermost ones. Ligules bluish. Achenes narrowly elliptic-oblong, flat, blackish-brown, ribbed, finely scabrid; beak 2–2.5 mm long, ± discolorous (white) at apex; pappus dirty white.

A polymorphic species, fairly cited form the Kashmir Himalayan territories. Mamgain & Rao (Fl. Ind. 12: 288. 1995) have treated it under genus *Lactuca*, and have followed Hook. f. (1881) in recognizing two varieties (p. 289) as follows:

1a. Leaves entire or lobed; achenes with brown and stout beak var. *decipiens*
1b. Leaves all pinnatifid; achenes with rather longer and white beak var. *multifida*

Roohi Bano & Qaiser (2010) have treated it under *Cicerbita* and added a 3rd variety- *pakistanica*; the three having been keyed out as follows:

1a. Leaves entire or lobed, if lobed, then upper lobe not further lobed, terminal lobe broad hastate or triangular 3.1 var. *decipiens*
1b. Leaves and upper lobes further lobed, pinnatifid with shallowly and deeply cut lobes 2

2a. Lower leaves up to 6 mm broad, 10–30 cm long, bipinnatifid up to 0.5 cm broad with toothed, acute segments 3.2. var. *multifida*
2b. Lower leaves up to 4 mm broad, 8–15 cm long, bipinnatifid up to 0.2 mm broad with entire, lyrate segments 3.3. var. *pakistanica*

3.1 **Cicerbita decipiens** (C. B. Clarke) Beauv. var. **decipiens**

Flowering and fruiting: July–September.

Distribution: Afghanistan, Pakistan, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal.

Specimens examined: Naranag: 2400 m, grassy slopes, *G.H. Dar* 4184; between Sonamarg and Kulan, 8.10.1913, *M.A. Evershed* s.n. (BM); Vishansar, hills above lake, 3600 m, 17.8.1940, *P.M. Pinfold* 369 (BM); Sonamarg, 15.8.1928, *R.R. Stewart* 9885 A (RAW); ibid.: *c*. 3300 m, September 1931, *R.R. Stewart* 12730 (M).

3.2 **Cicerbita decipiens** (C.B. Clarke) P. Beauv. var. **multifida** (Hook. f.) Roohi Bano & Qaiser in Pakistan J. Bot. Sp. Issue 42: 50. 2010. *Lactuca decipiens* C. B. Clarke var. *multifida* Hook.f., Fl. Brit. India 3: 407. 1881.

Flowering and fruiting: July–September.

Distribution: Afghanistan, Pakistan, India and Nepal.

Specimens examined: Sonamarg: 2700-3000 m, 22.7.1921, *R. R. & I. D. Stewart* 6380 (RAW); Zaji Pass, beyond Gangabal lakes, ± 3600 m, 10.8.1939, *R. R. Stewart* 18220 (KUH).

Notes: Mamgain & Rao (1995:289) have erroneously considered this variety as ndemic to Jammu & Kashmir.

3.3 **Cicerbita decipiens** (C. B. Clarke) Beauv. var. **pakistanica** Roohi Bano & Qaiser in Pakistan J. Bot. Sp. Issue 42: 51. 2010.

Flowering and fruiting: July–September.

Distribution: Pakistan, Baltistan, Kashmir.

Specimens examined: Sonamarg, 5.8.1921, *R. R. Stewart* 6545 (M); ibid.: 2700–3000 m, 22.7.1921, *R. R .& I. D. Stewart* 6782 (RAW); Zoji Pass, Ladakh road, ± 3300 m, August 1928, *R. R. Stewart* 9958 (RAW).

4. **Cicerbita lessertiana** (Wall. ex DC.) Mamgain & Rao in J. Bomb. Nat. Hist. Soc. 86(2): 273. 1989.

Perennial herb with tuberous rootstock; stem 3–5 mm broad, leafy. Leaves very variable; radical leaves ± subsessile, usually narrowly oblanceolate, entire or sinuately toothed or lyrate-pinnatifid with broad lobes, terminal lobe oblanceolate or elongate; cauline leaves small, sessile, linear. Capitula in terminal fascicles, on long flaccid villous peduncles, subcylindrical or campanulate, 1–2 cm long, 24–30-flowered. Involucral bracts 3-seriate, ± villous; outer bracts ovate-lanceolate, *c*. half the length of linear-oblong inner ones. Ligules blue or purple. Achenes brown, ellipsoid, flat, many-ribbed; beak 1.5–2 mm long, creamish-yellow; pappus pale white.

The species is very variable in its leaves. Mamgain & Rao (J. Bombay Nat. Hist. Soc. 86(2): 273. 1989) have differentiated it into 3 subspecies as follows:

1a. Leaves entire 4.2 subsp. *Lessertiana*
1b. Leaves shallowly lyrate-pinnatifid or mucronate-dentate 2

2a. Leaves shallowly lyrate-pinnatifid 4.3 subsp. *lyrata*
2b. Leaves mucronate dentate 4.1 subsp. *dentata*

In recognition of some intermediate forms and overlap in their distribution, Roohi Bano & Qaiser (2010) have, however, reduced these subspecies to varieties. Also, differentiation on the basis of a single leaf character does not warrant subspecies status.

4.1 **Cicerbita lessertiana** (Wall. ex DC.) Mamgain & R.R. Rao var. **dentata** (DC.) Roohi Bano & Qaiser in Pakistan J. Bot. Spl. Issue 42: 47. 2010. *Mulgedium lessertianum* var. *dentatum* DC., Prodr. 7: 251. 1838.

Lactuca lessertiana subsp. *dentata* (DC.) Stebbins in Ind. For. Records Bot. 1(6): 240. 1939; *Cicerbita lessertiana* subsp. *dentata* (DC.) Mamgain & R.R. Rao in J. Bombay Nat. Hist. Soc. 86(2): 273. 1989, & in Hajra & al., Fl. Ind. 12: 270. 1995.

Flowering and fruiting: July–September.

Distribution: Pakistan, NW Himalaya from Kashmir to Himachal Pradesh.

Specimens examined: Sarbal, *Keshavanand* 1323; Sangam (Amarnath side), 3300 m, moist hill slopes, 1.8.1974, *U. Dhar* 975 (KASH).

4.2 **Cicerbita lessertiana** (Wall. ex DC.) Mamgain & R.R. Rao var. **lessertiana**. *Mulgedium lessertianum* Wall. ex DC., Prodr. 7: 251. 1838.

Lactuca lessertiana (Wall. ex DC.) C.B. Clarke, Compos. Ind.: 270. 1876; Hook.f., Fl. Brit. India 3: 408. 1881.

Flowering and fruiting: July–September.

Distribution: Tibet, Pakistan (Baltistan, Gilgit); Himalaya from Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, through Nepal to Sikkim and Bhutan.

Specimens examined: Zojila, 3450 m, 27. 8. 1940, *Ludlow & Sheriff* 8032 a,b (BM); Gadsaar, 3600 m, 17.8.1940, *P.M. Pinfold* 346 a, f (BM).

4.3 **Cicerbita lessertiana** (Wall. ex DC.) Mamgain & R.R. Rao var. **lyrata** (Decne.) Roohi Bano & Qaiser in Pakistan J. Bot. Spl. Issue 42: 46. 2010. *Melanoseris lyrata* Decne. in Jacquem., Voy. Inde 4: 101, t. 109. 1844.

Lactuca lessertiana var. *lyrata* (Decne.) C.B. Clarke, Compos. Ind.: 270. 1876; *L. lessertiana* subsp. *lyrata* (Decne.) Stebbins, l. *c*. 240; *Cicerbita lessertiana* subsp. *lyrata* (Decne.) Mamgain & Rao in J. Bomb. Nat. Hist. Soc. 86 (2):273. 1989, & in Hajra & al., Fl. Ind. 12:272. 1995.

Flowering and fruiting: July–September.

Distribution: Pakistan, (Gilgit, Baltistan), Himalaya from Kashmir, Himachal Pradesh to Uttar Pradesh.

Specimens examined: Zojila, *c*. 3500 m, 27.8.1940, *Ludlow & Sheriff* 8032c (BM); Gadsar, 3600 m, 17.8.1940, *P.M. Pinfold* 346 b, c, e (BM).

5. **Cicerbita macrorhiza** (Royle) P. Beauv. in Bull. Soc. Bot. Genève 2(2): 120. 1910; Mamgain & Rao in Hajra & al., Fl. India 12: 272. 1995. *Mulgedium macrorhizum* Royle, Ill. Bot. Himal. Mount.: 251. t. 61. f. 1. 1835.

Prenanthes laevigata Wall., Numer. List No. 3269/369. 1831, nom. non Blume 1826; *Mulgedium laevigatum* DC., Prodr.: 7. 249. 1838; *Lactuca laevigata* (Wall. ex DC.) C.B. Clarke, Compos. Ind.: 269. 1876; *L. macrorhiza* (Royle) Hook.f., Fl. Brit. India 3: 408. 1881; *Cicerbita laevigata* (Wall. ex DC.) P. Beauv. in Bull. Soc. Bot. Genève 2(2): 120. 1910; *C. macrorhiza* (Royle) P. Beauv. var. *saxatilis* (Edgew.) P. Beauv. in Bull. Soc. Bot. Genève 2(2):135. 1910; *Cephalorrhynchus macrorhizus* (Royle) Tuisl, Ann. Naturhist. Mus. Wien. 72: 618. 1968.

Perennial, glabrous or sparsely villous herb; rootstock thick, woody; branches many from the base, ascending. Leaves membranous, variable, usually linear or elongate-obovate and pinnately lobed; lower leaves with dilated or winged petiole, terminal lobe large, ovate-cordate, acute-mucronate; upper leaves sometimes entire. Capitula in terminal drooping corymbose raceme, campanulate, 12–18 mm long, 10–15-flowered, villous; peduncle bracteate. Involucral bracts 3-seriate, successively smaller from the outer ovate-lanceolate ones, through the middle lanceolate, to the innermost linear-oblong bracts. Ligules grey-blue or purplish. Achenes elliptic-lanceolate, flat, 4.5–5.5 mm long, black when ripe, 5-ribbed, smooth; beak c. 1.5 mm long, pale; pappus 2-seriate, snowy white.

Flowering and fruiting: July–September.

Distribution: Iran, Afghanistan, Pakistan, India (Himalaya: Jammu & Kashmir, Himachal Pradesh, Punjab, Uttarakhand, West Bengal and Manipur), Nepal, Bhutan and China.

Specimens examined: Nilnai, 3700 m, rocky cliffs at the Pass, *G.H. Dar* 8321; Sonamarg, 4.9.1921, *R.R. & I.D. Stewart* 6922 (RAW).

6. **Cicerbita rapunculoides** (DC.) P. Beauv. in Bull. Soc. Bot. Genève 2(2): 127. 1910. *Mulgedium rapunculoides* DC., Prodr. 7: 249. 1838.

Lactuca rapunculoides (DC.) C.B. Clarke, Compos. Ind.: 268. 1876; Hook.f., Fl. Brit. India 3: 407. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 292. 1995.

Biennial or perennial herb; stems erect, paniculately branched above. Leaves simple; lower leaves petiolate, ovate-triangular, margins subentire-sinuate toothed and incurved, base hastate-truncate and auricled; upper leaves sessile, usually lanceolate. Capitula in a terminal panicle, cylindrical, 1.4–1.8 cm long, 5-flowered; peduncle drooping, slender, bracteate. Involucral bracts 2-seriate, dorsally papillose; outer ones ovate-lanceolate, blackish; inner ones linear-oblong, 4 to 5 times as long as the outer bracts. Ligules purplish. Achenes ellipsoid-fusiform, 6–10 mm long, brown, 5–7-ribbed, scabrid-hispid; beak 1.5–3 mm long, brown; pappus 2-seriate, outer yellow, inner dirty white.

Flowering and fruiting: July–September.

Distribution: E. Afghanistan, Pakistan, Himalaya from Kashmir and Himachal Pradesh to Nepal.

Specimens examined: Sonamarg, 3090 m, 24.8.1876, *C.B. Clarke* 30836 D (BM); ibid. 3000–3300 m, 5.8.1921, *R.R. Stewart* 6546 (RAW); ibid., 19.8.1946, *R.R. Stewart* 22383 (RAW); Below Gadsar, Gangabal region, ± 3300 m, 11.8.1939, *R.R. Stewart* 18282 (RAW); Zoji Pass, ± 3300 m, 30.8.1940, *R.R. Stewart* 21224 (KUH).

23. **LACTUCA** L., Sp. Pl.: 795. 1753; Gen. Pl. ed. 5: 348. 1754.

Distributed chiefly in the N. temperate regions, Asia to New Guinea, N. America, S. and tropical Africa. Species *c*. 60, of these 5 species occur in Sind Valley.

Key to the species

1a. Leaves coriaceous; achenes very shortly beaked; pappus twice as long as achene body 5. *L. tatarica*
1b. Leaves usually membranous; achenes conspicuously beaked; pappus shorter than or as long as the achene body 2

2a. Beak of achene rather stout, as long as its body 3. *L. hastata*
2b. Beak of achene capillary, shorter than, equal to, or longer than its body 3

3a. Leaves linear-oblong, usually entire, acuminate; achene beak shorter than or as long as its body 2. *L. dolichophylla*
3b. Leaves not linear-oblong, lyrate or runcinate-pinnatifid, not acuminate; achene beak as long as or longer than its body 4

4a. Leaves usually spinulose-toothed, midrib prickly beneath; achenes with 6–8-ribbed faces, scabrid along ribs; beak about equalling the body 4. *L. serriola*
4b. Leaves neither spinulose-toothed nor prickly along the midrib beneath; achenes with 3-ribbed faces, transversely rugose; beak twice the length of body 1. *L. dissecta*

1. **Lactuca dissecta** D. Don, Prodr. Fl. Nepal.: 164. 1825; Hook.f., Fl. Brit. India 3: 405. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 297. f. 75. 1995.

Lactuca auriculata DC., Prodr. 7: 140. 1838.

Annual, glabrous; stems usually dichotomously branched from the base; branches slender, leafy. Leaves usually pinnatifid; lobes variable: radical leaves usually many, sessile; lower cauline shortly petioled; upper ones sessile, lobed at the base; uppermost leaves linear. Capitula on corymbose slender bracteate peduncles, erect, 6–12 mm long. Outer involucral bracts ovate or obovate, much shorter than the inner linear bracts. Ligules pale blue. Achenes oblanceolate, flat, 3-ribbed on each face, margins thickened; beak white, very slender, twice as long as the body; pappus shorter than achene.

Flowering and fruiting: April–June.

Distribution: C. Asia, Afghanistan, Pakistan, Tibet; Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal; Punjab, Haryana, Delhi and Madhya Pradesh.

Specimens examined: Tulmulla, 1650 m, veg. fields, *G.H. Dar* 1300; Beehama, 1650 m, mud walls, *G.H. Dar* 5318; Wayil: 1725 m, veg. fields, *G.H. Dar* 5323.

2. **Lactuca dolichophylla** Kitam. in Hara, Fl. E. Himal. 1: 341. 1966; Mamgain & Rao in Hajra & al., Fl. India 12: 299. 1995.

L. longifolia DC., Prodr. 7: 135. 1838, non Michx. 1803; Hook.f., Fl. Brit. India 3: 405. 1881. *L.wallichiana* Tuisl, 1968.

Annual or biennial, almost glabrous herb; stems paniculately branched above. Leaves variable, sessile, mostly linear-oblong, long-pointed, stem-clasping with basal lobes appressed to the stem, entire. Capitula on slender erect peduncles, 1–1.5 cm long, erect. Outer involucral bracts few, ovate; inner bracts linear-oblong, much longer than outer ones. Ligules blue-purple. Achenes elliptic or oblanceolate, thickened along margins, nearly smooth, faces 3–5-veined; beak capillary, not longer than the body; pappus slightly shorter than achene.

Flowering and fruiting: July–September.

Distribution: Afghanistan, Pakistan, W. China, W. & C. Himalaya from Kashmir to Nepal.

Specimens examined: Naranag, 2400 m, forest floor, *G.H. Dar* 4218; Gagangir, 2300 m, maize fields, *G.H. Dar* 8555.

3. **Lactuca hastata** DC., Prodr. 7: 139. 1838; Hook.f., Fl. Brit. India 3: 407. 1881.

Cicerbita cyanea (D. Don) P. Beauv. In Bull. Soc. Bot. Genève 2(2): 132. 1910; Mamgain & Rao in Hajra & al., Fl. India 12: 268. 1995; *Sonchus cyaneus* D. Don, Prodr. Fl. Nepal.: 164. 1825; *Cicerbita cyanea* var. *glandulifera* (Franch.) P. Beauv., l.*c*. 133.

Perennial, 1 m or more high, erect herb; stems usually robust, glabrous below, glandular-pubescent above. Leaves variable, with naked or winged petioles, base dilated or 2-lobed; blade pinnately lobed, terminal lobe broad, hastate, deltoid or ovate, coarsely toothed. Capitula on nodding peduncles forming a terminal panicle, 1.5–2.5 cm long. Involucral bracts bristly hairy; outer bracts many-seriate, about half the length of narrower inner bracts. Ligules blue-purple. Achenes obovate or elliptic, flat, margins thickened, irregularly ribbed, smooth; beak slender, equalling the body; pappus shorter or equalling the achene.

Flowering and fruiting: July–October.

Distribution: SW. China, Tibet; Temperate Himalaya from Kashmir, Himachal Pradesh, Punjab, Uttarakhand, Nepal to Sikkim; Assam, Khasiya, W. Bengal, Meghalaya, Nagaland, Kerala, and Tamil Nadu.

Specimens examined: Sarbal, 2700 m, *G.H. Dar* 3628 ; Baltal : 2900 m, sandy slopes, *G.H. Dar* 3955; Naranag, 2400 m, forest floor, *G.H. Dar* 4177; Gagangir: 2300 m, rocky slopes *G.H. Dar* 8609; Sonamarg, 2700 m, banks of Sind river, *G.H. Dar* 8782.

4. **Lactuca serriola** Tourner in L., Cent. Pl. 2: 29. 1756; Mamgain & Rao in Hajra & al., Fl. India 12: 300. F. 76. 1995.

L. scariola L., Amoen. Acad. 4: 489. 1759 & Sp. Pl. ed. 2: 1119. 1763; Hook.f., Fl. Brit. India 3: 404. 1881.

Annual or biennial, erect herb; stems leafy, branched, usually prickly towards the base. Leaves variable in shape, sessile, runcinate-pinnatifid, segments toothed; lower surface usually prickly on the midrib and nerves; cauline leaves sagittate. Capitula cylindric, erect, on corymbosely-branched erect bracteate peduncles, 9–12 mm long. Outer involucral bracts ovate-triangular, much shorter than the narrower inner bracts. Ligules, pale yellow. Achenes brown, oblanceolate, flat, many-ribbed; beak very slender, equalling the body; pappus shorter than achene.

Flowering and fruiting: June–November.

Distribution: Europe, Tropical Africa, Australia, W. Asia, Afghanistan, Pakistan, and Himalaya from Kashmir to Kunawar, Arunachal Pradesh.

Specimens examined: Beehama, 1650 m, in veg. fields, *G.H. Dar* 2884; Ganderbal, 1650 m, on mud walls, *G.H. Dar* 2933; Kangan, 1900 m, in maize fields, *G.H. Dar* 8376; Hari Ganiwan, 2000 m, in maize fields, *G.H. Dar* 8477.

5. **Lactuca tatarica** (L.) C.A. Meyer, Enum. Fl. Cauc.: 56. 1831. Mamgain & Rao in Hajra & al., Fl. India 12: 287. 1995 *Sonchus tataricus* L., Mant. Pl.: 572. 1771.

Lactuca clarkei Hook.f., Fl. Brit. India 3: 406. 1881; *L. tatarica* var. *tibetica* Hook.f., *l.c.* 406.

Annual or biennial, sometimes perennial, glabrous herb; stems stout, erect, leafy, paniculately branched above. Leaves sessile, coriaceous; radical and lower cauline leaves sinuate-toothed or runcinate-pinnatifid and sharply toothed; upper cauline leaves usually less lobed, base simple or auricled. Capitula erect, on panicled peduncles, 1–2 cm long, many- flowered. Outer involucral bracts ± ovate, much shorter than the inner ones. Ligules yellow. Achenes narrowly oblong, strongly ribbed, quite smooth; beak very short, cylindric; pappus silvery, twice as long as the achene.

Flowering and fruiting: April–July.

Distribution: Europe, C. Asia, Mongolia, Iran, Siberia, W. Tibet, Afghanistan, Pakistan, W. Himalaya from Kashmir to Himachal Pradesh.

Specimens examined: Badrakund, along Power House Canal, 1775 m, *G.H. Dar* 1336; Beehama, roadsides, 1650 m, *G.H. Dar* 1900; Ganderbal: 1775 m, masonry bunds, *G.H. Dar* 2344; Sarich, masonry bunds, 1700 m, *G.H. Dar* 4614.

24. **PRENANTHES** L., Sp. Pl.: 797. 1753.

Distributed in Europe, Asia, S. to Tropical Africa. Species 8, of which 2 occur in Sind Valley.

Key to the species

1a. Peduncle erect; capitula erect, 1–2 mm across; achenes ± oblong, narrowed downwards, rounded at apex; pappus white or brownish, slightly shorter than achene body 1. *P. brunoniana*

1b. Peduncle drooping; capitula pendulous, 3–5 mm across; achenes ± ellipsoid, narrowed towards both ends, contracted at apex; pappus snowy white, longer than achene body 2. *P. violifolia*

1. **Prenanthes brunoniana** Wall. ex DC., Prodr. 7: 195. 1838; Hook.f., Fl. Brit. India 3: 411. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 313. f. 81. 1995.

Prenanthes raphanifolia DC., Prodr. 7: 195. 1838; *P. hispidula* DC., Prodr. 7: 195. 1838; C.B. Clarke, Compos. Ind. 266. 1876; *Lactuca brunoniana* (Wall. ex DC.) C.B. Clarke, Compos. Ind.: 266. 1876; *Cicerbita brunoniana* (Wall. ex DC.) Tuisl ex Rech.f., Fl. Iran, 122: 184. 1977.

Annual or biennial, smooth or rough, erect herb, with spreading branches. Leaves variable, with long or short petioles, naked or winged at the base; lamina membranous, ovate, triangular, cordate or truncate-hastate at base, toothed, often pinnatifid with variously cut and toothed lobes. Capitula in a terminal panicle, ± cylindrical, 12–18 mm long, erect, each with 3–5 florets. Outer involucral bracts blackish-yellow, ovate-lanceolate, unequal; inner ones linear-oblong, much longer. Ligules pink-purple. Achenes ± oblong, narrowed downwards, ± rounded at the tip; pappus white or pale brownish, slightly shorter than achene body.

Flowering and fruiting: July–September.

Distribution: Iran, Afghanistan, China, Pakistan, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Bhutan.

Specimens examined: Baltal, 2900 m, sandy slopes, *G.H. Dar* 3844 and 3954; Naranag: 2400 m, forest floor, *G.H. Dar* 4174.

2. **Prenanthes violifolia** Decne. in Jacquem., Voy. Inde: 100, t. 108. 1844; Hook.f., Fl. Brit. India 3: 412. 1881 Mamgain & Rao in Hajra & al., Fl. India 12: 316. 1995.

Lactuca violifolia (Decne.) C.B. Clarke, Comp. Ind. 269, 1876; *Cicerbita violifolia* (Decne.) Beauv. in Bull. Soc. Bot. Genêve 2(2):122. 1910; *Prenanthes brunoniana* var. *raphanifolia auct. non* Hook.f.: Kitam. in Fa. & Fl. Nep. Himal. 269. 1955.

Biennial or perennial, shorter herb; stem slender, simple or sparingly branched, glabrous to softly hairy. Leaves petiolate; petiole long, widely winged at base; lamina ovate-cordate, deltoid-hastate or sagittate at base, sinuate-tooth, entire or pinnately lobed; terminal lobe ovate-triangular with subentire, undulate-toothed margin.

Capitula in a loose panicle, 1.2–2.5 cm long, pendulous, on drooping peduncles, florets 5–6. Outer involucral bracts ± ovate, unequal; inner ones linear, much longer. Ligules purplish-blue. Achenes ± ellipsoid, pale brownish, narrowed towards both ends; pappus snowy white, longer than achene body.

Flowering and fruiting: July–September.

Distribution: Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal, Assam, Myanmar and Bhutan.

Specimen examined: Near Sonamarg, *R. R. Stewart* 15206.

25. **SONCHUS** L., Sp. Pl.: 793. 1753; Gen. Pl. ed. 5: 347. 1754.

Distributed widely as weeds, native chiefly in Old World, N. temperate regions and C. Asia, also Australia and New Zealand. Species *c.* 80, of which 4 species occur in Sind Valley.

Key to the species

1a.	Plants annual, non-rhizomatous	2
1b.	Plants perennial, rhizomatous	3
2a.	Auricles of cauline leaves acute, usually spreading; involucral bracts often glandular-hispid outside; achenes distinctly muricate between the ribs	3. *S. oleraceus*
2b.	Auricles of cauline leaves obtuse, appressed; involucral bracts often glabrous outside; achenes faintly muricate between the ribs	1. *S. asper*
3a.	Involucral bracts densely pilose glandular hairy outside; achenes elliptic, scarcely compressed; pappus many-seriate, two times as long as the achene body	4. *S. wightianus*
3b.	Involucral bracts glabrous outside or with non-glandular simple hairs at base; achenes oblong-oblanceolate, compressed; pappus few-seriate, about three times as long as the achene body	2. *S. brachyotus*

1. **Sonchus asper** (L.) Hill, Herb. Brit. 1: 47. 1769; C.B. Clarke, Compos. Ind.: 275. 1876; Hook.f., Fl. Brit. India 3: 414. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 318. f. 82. 1995. *S. oleraceus* L. var. *asper* L., Sp. Pl.: 794. 1753.

Annual, glabrous or sparsely glandular herb; stems angled, hollow, fleshy. Leaves subcoriaceous, variable, ovate-oblanceolate to lanceolate; cauline leaves half-amplexicaul with a rounded basal auricle, pinnatifid or runcinate-pinnatifid, teeth numerous, long and spinous. Capitula crowded in umbellate cymes, 1–2.5 cm across. Involucral bracts many-seriate, usually glabrous. Ligules yellow. Achenes flattened, 3-ribbed on either face, faintly muricate between the ribs. Pappus creamy white, few-seriate, double the length of achene body.

Flowering and fruiting: April–June.

Distribution: A cosmopolitan weed; occurs throughout India.

Specimens examined: Nunar, orchards, 1700 m, *G.H. Dar* 1656; Kujar, borders of paddy fields, 1850 m, *G.H. Dar* 6594.

2. **Sonchus brachyotus** *DC., Prodr.* 7: 186. 1838; Mamgain & Rao in Hajra & al., Fl. India 12: 320. 1995.

S. arvensis L. var. *glaber* Haines, Bot. Bihar & Orissa 2: 522. 1922.

Perennial, rhizomatous herb, with terete and branched stems. Leaves often radical; cauline leaves glabrous, with short obtuse auricles, margin entire or spinous-toothed, apex obtuse or acute. Capitula erect, 1–1.5 cm across, slightly tomentose at base; peduncles slender, glabrous or sparsely white tomentose. Involucral bracts many-seriate. Ligules yellow. Achenes oblong-oblanceolate, compressed, smooth. Pappus white, few-seriate, about three times the length of achene body.

Flowering and fruiting: April–July.

Distribution: Tibet, China, Thailand, Korea, Japan, C. Asia, Mongolia, India (Jammu & Kashmir, Himachal Pradesh, Punjab, Madhya Pradesh and Arunachal Pradesh).

Specimen examined: Tulmulla: along rice fields, heads bright yellow, 27.5.1975, *A. R. Azad* 1089 (KASH).

3. **Sonchus oleraceus** L., Sp. Pl.: 794. 1753; C.B. Clarke, Compos. Ind.: 275. 1876; Hook.f., Fl. Brit. India 3: 414. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 321. f. 83. 1995. Milk Weed, *Dodij.*

Annual, sparsely hispid; stems faintly angular and grooved. Leaves thin, variable, more commonly runcinate-pinnatifid; basal leaves with a winged petiole; cauline leaves half-amplexicaul, marginal teeth small soft, auricles acute or acuminate, entire or pinnatifid, the midrib beneath usually with a row of bristles. Capitula mostly in short-peduncled umbellate cymes, 1–2.5 cm across. Involucral bracts many-seriate, often glandular-hispid. Ligules bright yellow. Achenes obovoid, compressed, 3–5-ribbed, distinctly muricate between the ribs. Pappus white, double the length of achene body.

Flowering and fruiting: April–July.

Distribution: A cosmopolitan weed; found throughout India.

Specimens examined: Beehama, 1650 m, masonry walls, *G.H. Dar* 599; Shallabugh, 1600 m, under willow plantation, *G.H. Dar* 1038; Doderhama, 1650 m, in veg. fields, *G.H. Dar* 2121; Badrakund, 1650 m, on mud walls, *G.H. Dar* 2557; Sarich, 1675 m, masonry bunds, *G.H. Dar* 4558; Prang, 1800 m, masonry banks of Bijli canal, *G.H. Dar* 4639; Wayil, 1750 m, cult. fields, *G.H. Dar* 6589; Prang, 1800 m, *G.H. Dar* 6589a; Kangan, 1850 m, in maize fields, *G.H. Dar* 8380.

4. **Sonchus wightianus** DC., Prodr. 7: 187. 1838; Mamgain & Rao in Hajra & al., Fl. India 12: 321. 1995.

S. arvensis auct. non L.: C.B. Clarke, Compos. Ind.: 276. 1876, p.p.; Hook.f., Fl. Brit. India 3: 414. 1881, p.p.; *S. arvensis* f. *integrifolius auct. non* Bisch.: Kitam. in Fr. & Fl. Nep. Himal.: 271. 1955.

Perennial herb with long, creeping rootstock; stems terete or somewhat angled, umbellately branched above. Leaves radical and cauline, thin, simple, lanceolate to oblanceolate, entire or pinnatifid or runcinate-pinnatifid, apex acute, margin denticulate, base rounded, auriculate, glabrous or pubescent when young, undersurface ± glaucous. Capitula solitary or several, 1–2 cm across, erect. Involucral bracts many-seriate, densely pilose glandular-hairy. Ligules yellow, apically shallowly 5-toothed. Achenes narrowly ellipsoid, scarcely compressed, obscurely 5-ribbed on each side, transversely wrinkled, smooth. Pappus milky white, many-seriate, double the length of achene body.

A variable species, usually divided into two subspecies as follows (Mamgain & Rao in Hajra & al., Fl. India 12: 323. 1995):

1a. Stems glabrous; capitula densely white tomentose ..... 4.1. subsp. *wallichianus*
1b. Stems glandular-hairy; capitula glandular-hairy, often mixed with white tomentum at base ..... 4.2 subsp. *wightianus*

4.1. **Sonchus wightianus** DC. subsp. **wallichianus** (DC.) Boulos in Bot. Not. 125: 297. 1972. *Sonchus wallichianus* DC., Prodr. 7: 185. 1838.

S. arvensis var. *laevipes auct. non* Koch: Kitam. in Fr. & Fl. Nep. Him. 271. 1955.

Distribution: Afghanistan, Pakistan, China, Himalaya (Nepal to Bhutan), Assam, Bihar.

4.2 **Sonchus wightianus** DC. subsp. **wightianus**

Flowering and fruiting: May–August.

Distribution: Afghanistan, Pakistan, China, Himalaya (Kashmir eastward through Nepal to Myanmar), Bhutan, Malaysia, Indonesia, Philippines, Sri Lanka; throughout India from 300 m to 3000 m.

Specimens examined: Saloora: 1630 m, roadsides, *G.H. Dar* 1012; Nunar: 1700 m, in orchards, *G.H. Dar* 1659; Sarich: 1700 m, in maize fields, *G.H. Dar* 2992; *G.H. Dar* 4614 (KASH, E).

Notes: S. Gould in Hara & al., Enum. Fl. Pl. Nepal 3: 44. 1982 have considered it possible that this species may not be distinct from *Sonchus arvensis* L., and suggest further study.

26. **HIERACIUM** L., Sp. Pl.: 799. 1753; Gen. Pl. ed. 5: 350. 1754.

Chiefly distributed in W. Europe, some species in Asia, N. & S. America and S. Africa. Species *c.* 1000, 3 species occur in Sind Valley.

Key to the species

1a.	Radical leaves persistent	3. *H. vulgatum*
1b.	Radical leaves usually absent	2
2a.	Capitula 0.5–1 cm across; pappus white or yellowish-white, 5–6 mm long	1. *H. prenanthoides*
2b.	Capitula 1–1.5 cm across; pappus yellowish, 5–8 mm long	2. *H. umbellatum*

1. **Hieracium prenanthoides** Vill., Prosp.: 35. 1779; Hook.f., Fl. Brit. India 3: 400. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 242. 1995.

Perennial, branched, leafy herb. All leaves almost cauline, sessile, ovate-oblong to linear-oblong, denticulate or entire, the uppermost cordate. Capitula cylindric, on branched leafy peduncles, 0.5–1 cm across. Outer involucral bracts ± ovate, inner ones ± linear. Ligules yellow. Achenes ± compressed, 3–4 mm long, black to reddish-brown; pappus white or yellowish-white, longer than achenes.

Flowering and fruiting: June–September.

Distribution: N. and M. Europe, W. Asia, China, Kashmir Himalaya.

Specimens examined: Sind Valley, *C.B. Clarke* 30968, 30984.

2. **Hieracium umbellatum** L., Sp. Pl.: 804. 1753; Hook.f., Fl. Brit. India 3: 400. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 243. 1995.

Biennial or perennial, branched, leafy herb. All leaves cauline, alternate, sessile, crowded, linear to linear-oblong, mostly serrate, rarely entire, the uppermost linear-lanceolate. Capitula broadly cylindric, on bracteate peduncles, 1–1.5 cm across. Outer involucral bracts ± ovate, about half the length of inner linear-lanceolate bracts. Ligules yellow. Achenes blackish, ± compressed, 3–5 mm long, faintly ribbed; pappus yellowish, longer than achenes.

Flowering and fruiting: June–September.

Distribution: China, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to W. Nepal.

Specimen examined: Sonamarg, *R. R. Stewart* 13498.

Notes: A variable species, usually divided into two varieties as follows: var. *umbellatum* (stems comparatively tall and thick) and var. *lanceolatum* Hook.f. (stems short, slender). Both these varieties occur in Jammu & Kashmir, while the latter species being endemic to this region.

3. **Hieracium vulgatum** Fries, Fl. Hall. 128. 1819; Hook.f., Fl. Brit. India 3: 399. 1881; Mamgain & Rao in Hajra & al., Fl. India 12: 245. f. 59. 1995.

Biennial or perennial, usually branched herb. Radical leaves petiolate, oblanceolate or oblong-oblanceolate, long-pointed, irregularly and coarsely toothed; cauline leaves smaller, upper ones sessile. Capitula many, on glandular-hairy peduncles, 0.5–1 cm across. Involucral bracts often cottony in bud, usually glandular, outer ones much shorter than the inner. Ligules yellow. Achenes blackish, ± compressed, 2.5–4.5 mm long; pappus whitish-yellow, somewhat longer than achenes.

Flowering and fruiting: June–September.

Distribution: N. Asia, Europe, Arctic America, W. Himalaya from Kashmir, Himachal Pradesh to Garhwal (Uttarakhand).

Specimen examined: Pranshur: 3400 m, rocky slopes, *G.H. Dar* 8108 (KASH, E).

27. **GARHADIOLUS** Jaub. & Spach, Illustr. Pl. Orient. 3: 119. t. 284, 85. 1849.

Distributed in Caucasus, near East, C. and E. Asia. Species 2, of which 1 occurs in India.

Garhadiolus minutissimus (Bunge) Kitam. in Acta Phytotax. Geobot. 17: 35. 1957; Mamgain & Rao in Hajra & al., Fl. India 12: 334. 1995. *Hedypnois minutissima* Bunge, in Mem. Etrt. Petersb. 7: 372. 1847.

Rhagadiolus hedypnois Fisch. & May., non All. 1785; Hook.f., Fl. Brit. India 3: 392. 1881.

Annual, dwarf, diffusely branched herb; branches all spreading from the base. Leaves obovate-oblong, narrowed into a petiole, toothed or pinnatifid. Capitula small, 6–8 mm long, axillary in the forks or terminal. Involucral bracts uniseriate, small, keeled, sub-spinulose or smooth in fruit. Ligules 5-toothed, yellow. Achenes narrowed from the base to the incurved tip, terete, smooth, glabrous; pappus double.

Flowering and fruiting: April–June.

Distribution: Asia Minor, Caucasus, Syria, Iran, Afghanistan, Pakistan and Kashmir.

Specimen examined: Bonzilla, Haripora; 1950 m, open slopes, *G.H. Dar* 5075.

28. **PICRIS** L., Sp. Pl.: 792. 1753; Gen. Pl. ed. 5: 347. 1754.

Distributed in Europe, Africa, N. Asia and W. Asia, Australia, and New Zealand. Species 50–60, of these 1 occurs in India.

Picris hieracioides L., Sp. Pl.: 792. 1753; Hook.f., Fl. Brit. India 3: 393.1881; Mamgain & Rao in Hajra & al., Fl. India 12: 235.1995.

Annual, coarsely hairy herb; stems corymbosely branched. Radical leaves petiolate, oblanceolate, sinuate-toothed, rugose, densely hairy; cauline leaves narrowly lanceolate, stem-clasping, usually entire. Capitula terminal, numerous, corymbose or paniculate; peduncles erect, bracteate. Involucral bracts narrowly ovate to linear-lanceolate, densely black-hairy. Ligules 5-toothed, yellow. Achenes terete, smooth, narrowed to both ends, ribbed, transversely wrinkled, brown when ripe; pappus plumose, white.

Flowering and fruiting: July–September.

Distribution: Australia, New Zealand, Europe, and Asia: China, Korea, Afghanistan, Pakistan, Karakorum, and Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal, Sikkim, and Meghalaya to Bhutan.

Specimens examined: Wayil: 1725 m, borders of paddy fields, *G.H. Dar* 2556; Nunar: 1700 m, roadsides, *G.H. Dar* 2758; Beehama: sandy slopes, *G.H. Dar* 3950.

Notes: A very variable and widespread species, divided by Kitamura (in Acta Phytotax. Geobot. 27: 37. 1957) into 3 subspecies: ssp. *hieracioides*, *kaimaensis* Kitam., and *nuristanica* Kitam. All these three subspecies are reported from Jammu & Kashmir.

29. **SCORZONERA** L., Sp. Pl.: 790. 1753; Gen. Pl. ed. 5: 346. 1754.

Distributed in Europe, N. Africa, W. & C. Asia. Species c. 180, of which 1 occurs in Sind Valley

Scorzonera virgata DC., Prodr. 7: 125. 1838; Mamgain & Rao in Hajra & al., Fl. India 12: 338. f. 88. 1995. *S. divaricata (DC.)* Hook.f., Fl. Brit. India 3: 418. 1881, *non* Turcz.

Perennial, glabrous herb, with a stout rootstock; stems usually branched from the base, grooved; branches divaricate. Leaves crowded at the base of stem, sessile and basally sheathing, slender, filiform, with incurved margins. Capitula broadly cylindric, 2–3.5 cm long, on slender long peduncles. Outer involucral bracts brownish, broadly ovate, unequal; inner ones linear-lanceolate to oblong, much longer. Ligules yellow, usually 5-toothed. Achenes very slender, lanceolate, ± compressed, pale, smooth, striate. Pappus hairs plumose below, pale white to yellowish, shorter than achene body.

Flowering and fruiting: July–September.

Distribution: Pakistan, W. Tibet, W. Himalaya from Kashmir to Kunawar (Himachal Pradesh), Mongolia.

Specimens examined: Zoji La: 3500 m, rocky slopes, *G.H. Dar* 7376; Sonamarg: 2800 m, mountain slopes, *G.H. Dar* 7733.

Notes: A second species reported from Jammu & Kashmir is *Scorzonera purpurea* L.

30. **TRAGOPOGON** L. Sp. Pl. 789. 1753; Gen. Pl. ed. 5: 346. 1754.

Distributed in Europe, N. Africa, temperate and subtropical Asia. Species c. 110, of which 1 occurs in Sind Valley.

Tragopogon kashmirianus G. Singh, Forest Fl. Srinagar 123. 1976; Mamgain & Rao in Hajra & al., Fl. India 12: 341.1995.

Biennial erect, almost glabrous herb; stem simple or branched. Leaves linear, gradually narrowed above from the dilated, sheathing base; upper leaves becoming gradually smaller. Capitula solitary on swollen peduncles. Involucral bracts uniseriate, lanceolate, longer than ligules. Ligules yellow. Achenes grayish-brown, gradually narrowed to a 1–2 cm long beak. Pappus connate at base, bristles tawny, straight, plumose, ashy, longer than achene including its stout beak.

Flowering and fruiting: May–June.

Distribution: Endemic to Kashmir.

Specimens examined: Sarich: 1700 m, in orchards, *G.H. Dar* 1749; Ganderbal: 1650 m, in vegetable fields, *G.H. Dar* 8369.

Notes: *Tragopogon kashmirianus* is said to be a tetraploid species, closer to *T. porrifolium* L. (Mamgain & Rao, Fl. India 12: 343. 1995). Four other species reported from Jammu & Kashmir are: *T. dubius* Scop., *T. gracilis* D. Don, *T. orientalis* L., and *T. sinuatus* Avé-Lall.

31. **CICHORIUM** L., Sp. Pl.: 813. 1753; Gen. Pl. ed. 5: 354, 1754.

Distributed in Europe, Mediterranean region and Middle East. Species 6, of which 1 occurs in Sind Valley.

Cichorium intybus L., Sp. Pl.: 813. 1753; Hook.f., Fl. Brit. India 3: 391.1881; Mamgain & Rao in Hajra & al., Fl. India 12: 248. f. 60. 1995. Eng: Chicory, Bunk; *Karipati.*

Perennial herb; roots fleshy, tapering; stems angled and grooved, hispid, branches rigid. Leaves runcinate, upper ones cordate amplexicaul. Capitula solitary terminal and axillary clustered; peduncle slender. Involucral bracts herbaceous, glandular-hispid, much shorter than corolla; ligules mostly bright blue, rarely white. Achenes ± compressed, angled, mottled; pappus 4–5 mm long.

Flowering and fruiting: June–September.

Distribution: Native of Europe; occurs as introduced in Iran, China, Afghanistan, Pakistan, and India (W. Himalaya from Kashmir to Himachal Pradesh, Punjab, Indo-gangetic plains, and Madhya Pradesh).

Specimens examined: Beehama: 1650 m, vegetable fields, *G.H. Dar* 1832; Haripora; 1725 m, roadsides, *G.H. Dar* 2904; Wayil: 1725 m, along paddy fields, *G.H. Dar* 6687.

Use: The whole plant is medicinal.

V. **Subfamily Asteroideae**

This subfamily in all comprises c. 1230 genera with c. 15600 species. The largest subfamily in our area, it is represented here by 40 genera with 82 species, belonging to 9 out of its total 20 tribes.

V.1 **Tribe Inuleae** Cass., 1819.

Cosmopolitan in distribution, usually concentrated in the Old World, particularly Australia and S. Africa, this tribe comprises c. 66 genera with c. 687 species. Represented in Sind Valley by 3 genera with 7 species.

32. **CARPESIUM** L., Sp. Pl.: 859. 1753; Gen. Pl. ed. 5: 369. 1754.

Distributed in S. Europe and temperate and subtropical Asia, Australia. Species c. 25, of which 2 species occur in Sind Valley.

Key to the species

1a.	Capitula solitary, terminal, 0.5–2.5 cm across, nodding; leaves usually elliptic-ovate	1. *C. nepalense*
1b.	Capitula numerous, all along the leafy branches, c. 6 mm across, horizontal; leaves usually lanceolate	2. *C. abrotanoides*

1. **Carpesium nepalense** Less. in Linnaea 6: 234. 1831.

Carpesium cernuum var. *nepalense* (Less.) *C.B. Clarke,* Compos. Ind.: 130. 1876; *C. cernuum* auct. non L.: Hook.f., Fl. Brit. India 3: 300. 1881; Kumar in Hajra & al., Fl. India 13: 6. 1995; *C. cernuum* var. *glandulosum* Hook.f., l.c. 301.

Perennial, erect herb; stems villose. Leaves shortly petioled, elliptic-ovate or elliptic-lanceolate, apex acute-acuminate, margin entire or denticulate, base attenuate, hirsute on both surfaces. Capitula dull yellow, solitary, terminal or from axils of upper leaves, 0.5–2.5 cm across, nodding, surrounded by several leafy bracts; involucral bracts 3 or 4-seriate, outer ones leafy, spreading. Florets tubular, bisexual, 3-lobed. Achenes 10-ribbed, with a short beak topped by a corona; pappus absent.

Flowering and fruiting: July–October.

Distribution: China, Taiwan, whole of the Himalaya.

Specimens examined: Beehama, 1650 m, shaded roadsides, *G.H. Dar* 2846; Doderhama: 1650 m, *G.H. Dar* 3105; Naranag, 2300 m, forest floor, *G.H. Dar* 4123; Ganderbal: 1650 m, in willow plantations, *G.H. Dar* 7572.

Notes: This species is often (mis)identified as *Carpesium cernuum* L., Sp. Pl.: 859. 1753. It is a highly variable taxon and has been divided into at least 7 varieties, the boundaries of which are not always clear, necessitating detailed biosystematic studies.

2. **Carpesium abrotanoides** L., Sp. Pl.: 860. 1753; Hook.f., Fl. Brit. India 3: 301. 1881; Kumar in Hajra & al., Fl. India 13: 6. f. 2. 1995.

Perennial, erect, ± glabrate herb. Branches long, slender, leafy to the tips. Leaves subsessile, usually lanceolate, apex acuminate, margin quite entire or serrate, base attenuate, pubescent on both surfaces. Capitula yellow, numerous, c. 6 mm across, subsessile, racemosely secund along the whole length of the leafy branches, horizontal; involucral bracts 3 or 4-seriate, the outer ones leafy apically. Florets tubular, bisexual, 5-toothed. Achenes finely ribbed, with a short beak topped by a minute corona; pappus absent.

Flowering and fruiting: July–October.

Distribution: Europe, Caucasus, Asia Minor, Iran, temperate Himalaya from Kashmir to Sikkim, China, Vietnam, Korea, Japan.

Specimens examined: Beehama: 1650 m, shaded roadsides, *G.H. Dar* 2857; Ganderbal: 1650 m, under willow plantation, *G.H. Dar* 7577.

33. **INULA** L., Sp. Pl.: 881. 1753; Gen. Pl. ed. 5: 375. 1754.

Mainly distributed in temperate and subalpine regions of Europe, Asia and Africa. Species *c.* 100, represented in Sind Valley by 4 species.

Key to the species

1a.	Capitula solitary, terminal	2
1b.	Capitula usually more than one, racemose or subcorymbose	3
2a.	Leaves 10–25 cm long, cauline few and distant; capitula (5–)7–10(–13) cm across; ray-florets to 5 cm long, 2-lobed	1. *I. royleana*
2b.	Leaves 4–8 cm long, cauline many and throughout the stem; capitula 4–7cm across; ray-florets to 2 cm long, 3-lobed	2. *I. orientalis*
3a.	Capitula in racemes, 4–8 cm across; leaves 15 cm or more long; ligules 2.5–3 cm long	3. *I. racemosa*
3b.	Capitula in subcorymbs, c. 2 cm across; leaves up to 15 cm long; ligules 1.5–2.5 cm long	4. *I. brittanica*

1. **Inula royleana** DC. Prodr. 5: 464. 1836; C. B. Clarke, Compos. Ind.: 118. 1876; Hook.f., Fl. Brit. India 3: 292. 1881; Blatter, Beaut. Fls. Kash. 1: 159. 1927; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash.: 755. 1972; S. Kumar in Hajra & al., Fl. India 13: 23. 1995; Shweta Shekhar & al., Rheedea 23(2): 124. f. 12, a-f. 2013.

Inula stolickzai C.B. Clarke, Compos. Ind:. 118.1876.

Perennial, erect, stout herb, with a creeping rhizome. Stem unbranched, grooved, pubescent. Radical leaves elliptic-ovate, obtuse, 10–25 cm long, with as long winged petiole; cauline leaves few, elliptic-lanceolate, acute, dentate-lyrate, base auricled. Capitula solitary, terminating a stout erect peduncle, showy and large (5–)7–10(–13) cm across, golden-yellow; involucral bracts leafy, many seriate, glandular-hairy, outer ones ovate with recurved tips, the inner slender-acuminate. Ray florets female, numerous, ligulate, to 5 cm long, 2-lobed; disc-florets bisexual, tubular, 5-lobed. Achenes *c.* 3 mm long; pappus up to 8 mm.

Flowering and fruiting: July–September.

Distribution: Pakistan, W. Himalaya from Kashmir to Himachal Pradesh.

Specimens examined: Zoji La: 3500 m, rocky slopes, *G.H. Dar* 7449; Pranshur: 3350 m, meadowlands, *G.H. Dar* 8148.

2. **Inula orientalis** Lam., Encycl. 3: 255. 1789; S. Kumar in Hajra & al., Fl. India 13: 20. f. 6. 1995; Shweta Shekhar & al., Rheedea 23(2): 121. f. 9, a-f. 2013.

Inula barbata Wall. ex DC., Prodr. 5: 470. 1836; C. B. Clarke, Compos. Ind.: 122. 1876. *I. grandiflora* Willd., Sp. Pl. 3: 2096. 1803; C. B. Clarke, Compos. Ind.: 123. 1876; Hook.f., Fl. Brit. India 3: 294. 1881; Blatter, Beaut. Fls. Kash. 1: 158. 1927; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash.: 752. 1972.

Perennial, stout, erect herb, with creeping underground rhizome. Stem unbranched, leafy throughout, pubescent with patent hairs. Leaves subsessile, elliptic-oblong or lanceolate, 4–8 cm long, apex acute-acuminate, base lobed, margin with glandular teeth and bristly hairs. Capitula solitary terminal on erect leafy stems, golden-yellow, 4–7 cm across; involucral bracts many seriate, toothed, bristly-hairy, the outer leafy and as long as the florets, the inner shorter. Ray-florets female, numerous, ligulate, linear-oblong, 1.7–2 cm long, 3-lobed; disc-florets bisexual, tubular, 5-lobed. Achenes c. 1mm long; pappus 4–5 mm long, pale brown.

Flowering and fruiting: July–September.

Distribution: Caucasus, Pakistan, W. Himalaya from Kashmir to C. Nepal.

Specimen examined: Sonamarg, *R. R. Stewart* 6687.

3. **Inula racemosa** Hook.f., Fl. Brit. India 3: 292. 1881; Blatter, Beaut. Fls. Kash. 1: 158. 1927; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash.: 752. 1972; S. Kumar in Hajra & al., Fl. India 13: 22. 1995; Shweta Shekhar & al., Rheedea 23(2): 122. f. 10, a-f. 2013. *Poshkar, Poshkar mool.*

Perennial, stout, erect herb. Stems to 1.5 m or more tall, branched, grooved, rough, pubescent. Leaves elliptic-lanceolate or obovate, 15–45 cm long, apex acute-acuminate, margin coarsely round-toothed, base narrowed to winged petioles; the upper leaves lanceolate, semi-amplexicaul with large basal lobes. Capitula in racemes, yellow, 4–8 cm across, on stout peduncle; involucral bracts many seriate, outer ovate and ± leafy, the inner oblong blunt. Ray-florets female, slender, ligulate, 2.5–3 cm long; disc-florets bisexual, tubular, 5-lobed, 1.5–1.8 cm long. Achenes 1.5–2.5 mm long; pappus 9–11 mm long, pale brown.

Flowering and fruiting: July–September.

Distribution: Afghanistan, Tibet, W. & C. Himalaya from Chitral to Nepal.

Specimen examined: Sonamarg: 2700 m, *G.H. Dar*, s.n.

Use: A well known medicnal and aromatic plant.

4. **Inula brittanica** L. Sp. Pl. 882. 1753; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash.: 752. 1972; S. Kumar in Hajra & al., Fl. India 13: 13. 1995; Shweta Shekhar & al., Rheedea 23(2): 116. f. 3, a-f. 2013.

Biennial to perennial, erect, pubescent herb. Leaves sessile, elliptic or ovate-elliptic to lanceolate, 5–15 cm long, 1.5–3.5 cm broad, entire or minutely toothed, acute-acuminate; upper ones ± amplexicaul and clasping. Capitula subcorymbose, on 1–3 cm long peduncles, relatively small, up to 2 cm across. Involucral bracts 3–4-seriate, flaccid; outer bracts sub-foliaceous, linear-lanceolate, deflexed; inner membranous. Ray-florets 1.5–2.5 cm long, much exceeding the involucral bracts; disc-florets 4–5 mm long. Achenes 1–2 mm long, narrowly obovate-oblong, sparsely pubescent; pappus uniseriate, 3–6 mm long, ± reddish brown.

Distribution: Europe, Turkey, Iran, Japan, S. Korea, Russia, Tajikistan, Turkmenistan, Uzbekistan, China, Pakistan, India (Jammu & Kashmir).

Specimens examined: Ganderbal, *R. R. Stewart* 7495.

34. **PULICARIA** Gaertn., Fruct. 2: 461. 1791.

Mediterranean, European, Asian and African in distribution; species c. 85, of which 1 occurs in Sind Valley.

Pulicaria dysenterica (L.) Bernh., Syst. Verz. (Bernhardi) 153. 1800; Hook.f., Fl. Brit. India 3: 298. 1881; Kumar in Hajra & al., Fl. India 13: 35. 1995. *Inula dysenterica* L., Sp. Pl.: 882. 1753.

Perennial, woolly herb. Stems mostly branched upwards, striate. Leaves alternate, sessile, oblong-lanceolate to cordate, base semi-amplexicaul, margin wavy to dentate, pubescent-glandular. Capitula yellow, heterogamous, 3 to many, 0.7–1.5cm across, densely woolly; involucral bracts setaceous, 4 or 5-seriate, purplish, linear-acuminate. Ray-florets exceeding the involucral bracts in size. Achenes oblong, 10-ribbed, silky; pappus copious, outer scales free.

Distribution: Europe and N. Africa, eastwards to Pakistan, Himalaya from Kashmir to Nepal.

Specimen examined: Ganderbal, in rice fields, *R. R. Stewart* 3376.

V.2 **Tribe Gnaphalieae** DC.

Distributed worldwide, especially in S. Africa and Australia, this tribe comprises *c*. 185 genera with *c*. 1240 species. Represented in Sind Valley by 5 genera with 10 species.

35. **ANAPHALIS** DC., Prodr. 6: 271.1837.

Distributed in Europe, Asia and America. Species *c.* 110, of which 4 occur in Sind Valley.

Key to the species

1a.	Involucral bracts usually acute, ± spreading in flower; leaves 1–7-veined	2
1b.	Involucral bracts usually obtuse, ± erect in flower; leaves 1–3-veined	3
2a.	Stems ± woody basally; stems and lower surface of leaves green, with many short glandular hairs; leaves 1-veined	2. *A. royleana*
2b.	Stems not woody basally; stems and lower surface of leaves white, with dense arachnoid hairs; leaves 1–7-veined	3. *A. triplinervis*
3a.	Leaves narrowly-linear, 1-veined; capitula 2–4 mm across	4. *A. virgata*
b.	Leaves mostly obovate-oblong, 1–3-veined; capitula 1–2 mm across	1. *A. adnata*

1. **Anaphalis adnata** DC. Prodr. 6: 274. 1838; Hook.f., Fl. Brit. India 3: 282. 1881; Pant in Hajra & al., Fl. India 13: 53. f. 16. 1995.

Gnaphalium adnatum Wall., Cat. 101, *n*. 2948. 1831, nom. nud.; *Gnaphalium adnatum* (Wall. ex DC.) Kitam. in J. Jap. Bot. 21: 51. 1947.

Perennial stout, erect herb, densely covered with white silky or cottony wool. Leaves sessile and narrowed to half-amplexicaul base, suberect, obovate-oblong, oblanceolate or subspathulate, leathery, 1–3-veined, margin entire. Capitula numerous, in dense rounded clusters on the stout branches of a large corymb, 1–2 mm across; involucral bracts many-seriate, membranous, rounded-ovate, obtuse, scarious and shiny, usually white. Florets yellow; the outer usually female, with filiform corolla; the inner ones bisexual, with 5-toothed corolla. Achenes with shining dots; pappus hairs silky white.

Flowering and fruiting: July–September.

Distribution: Temperate Himalaya from Kashmir to Bhutan, Assam, Burma, Indo-China, Philippines, China, Taiwan.

Specimen examined: Naranag: 2400 m, sandy slopes, *G.H. Dar* 4114.

2. **Anaphalis royleana** DC., Prodr. 6: 272. 1838; Hook.f., Fl. Brit. India 3: 280. 1881; Pant in Hajra & al., Fl. India 13: 71. 1995.

Anaphalis chionantha DC., Prodr. 6: 272. 1838; *A. polylepis* DC., Prodr. 6: 273. 1838.

Perennial herb, with a woody rootstock and stems much branched basally, glandular-hairy to densely tomentose. Leaves linear or linear-oblong, sessile, 1-veined, apex abruptly acute, base semi-amplexicaul, margin entire, recurved, densely grayish-white, woolly beneath. Capitula white, clustered in compact terminal corymbs, 5–10 mm across; involucral bracts many-seriate, scarious and shiny, outer and inner differing in shape and colour. Florets brownish-yellow; the outer few, female, with filiform corolla; the central ones bisexual, with 5-toothed corolla. Achenes papillose; pappus hairs white.

Flowering and fruiting: July–September.

Distribution: Pakistan, S. Tibet, China, Himalaya from Kashmir through Nepal to Sikkim, Bhutan, N. Myanmar and Taiwan.

Specimen examined: Gangabal lakes, *R.R. Stewart* 18172.

Notes: It is a variable species, usually divided into 3 varieties: var. *royleana*, *cana,* and *concolor* (see Pant in Fl. India 13: 72. 1995).

3. **Anaphalis triplinervis** (Sims.) C.B. Clarke, Compos. Ind.: 105. 1876; Hook.f., Fl. Brit. India 3: 281. 1881; Pant in Hajra & al., Fl. India 13: 77. 1995. *Antennaria triplinervis* Sims in Bot. Mag. 51: pl. 2468. 1824.

Perennial, rhizomatous, softly woolly herb; stems simple, tufted, often flexuous and striate, leafy. Leaves various, elliptic to linear-oblong or lanceolate or the lowest obovate-spathulate, 1–7-veined, apex acute or with a naked awn, margin entire, base clasping in upper leaves and contracted to a petiole in lower ones. Capitula solitary, or more in terminal corymbs, white, 0.3–1(–1.5) cm across; involucral bracts many-seriate, ovate or elliptic-lanceolate, scarious and shining-white. Florets yellow; the marginal female, with filiform, ± 4-toothed corolla; the central ones bisexual, with 5-toothed corolla. Achenes tubercled-hairy; pappus hairs white.

Distributed from Afghanistan to S. W. China, *A. triplinervis* is a very variable species, often divided into 3 varieties as follows:

1a. Plants 30–60 cm high; leaves elliptic or obovate, 5–10 cm long, 3–7-veined; 3.1.var. *triplinervis*
1b. Plants usually less than 30 cm high; leaves ± lanceolate or the lowest obovate-spathulate, 1–4 cm long, 1–3-veined 2

2a. Plants up to 30 cm high; leaves lanceolate, mostly 3–4 cm long; capitula usually many, 3–4 mm across 3.2. var. *intermedia*
2b. Plants 5–10 cm high; leaves narrow-lanceolate, 1–2 cm long; capitula 1 or a few, 8–15 mm across 3.3 var. *monocephala*

3.1 **Anaphalis triplinervis** (Sims) C.B. Clarke var. **triplinervis**

Flowering and fruiting: July–October.

Distribution: Afghanistan, Pakistan, Himalaya from Kashmir to Bhutan, S. Tibet, S. China, Taiwan.

Notes: According to Polunin & Stainton (1984), it is very common in forest clearings and grazing grounds from 1800 to 3300 m.

3.2 **Anaphalis triplinervis** (Sims) C.B. Clarke var. **intermedia** (DC.) Airy Shaw in Bot. Mag. 158: t. 9396. 1935. *Antennaria triplinervis* var. *intermedia* DC., Prodr. 6: 270. 1838.

Anaphalis nubigena DC., Prodr. 6: 272. 1838; Hook.f., Fl. Brit. India 3:279.1881, p.p.; *Antennaria triplinervis* var. *cuneifolia* DC., Prodr. 6: 272. 1838; *Anaphalis cuneifolia* (DC.) Hook.f., 1881; *A. mairei* H. Lév.,1915; *A. nepalensis* (Spreng.) Hand.-Mazz., 1936.

Flowering and fruiting: July–September.

Distribution: Afghanistan, Pakistan, W. and E. Himalaya from Kashmir to Bhutan, S. Tibet, and W. China.

Notes: According to Polunin & Stainton (1984), it occurs in forests and grazing grounds from 2900–4100 m.

3.3. **Anaphalis triplinervis** (Sims) C.B. Clarke var. **monocephala** (DC.) Airy Shaw in Bot. Mag. 158: t. 9396. 1935. *A. monocephala* DC., Prodr. 6: 272. 1838.

A. nubigena auct. non DC.: Hook.f., Fl. Brit. India 3: 280. 1881, p.p. *A. nubigena* var. *nubigena* proper.

Flowering and fruiting: June–September.

Distribution: W. and E. Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Sikkim; Tibet, S. China, Bhutan, Taiwan.

Specimens examined: Baltal, 3000 m, rocky slopes, *G.H. Dar* 4039; Zoji La, 3500 m, rocky slopes, *G.H. Dar* 7318; Pranshur: 3400 m, rocky slopes, *G.H. Dar* 7881 and 8151.

Notes: According to Polunin & Stainton (1984), it is common in the alpines of Himalaya from 3400 to 5000 m.

4. **Anaphalis virgata** Thomson in C.B. Clarke, Compos. Ind.: 107. 1876; Hook.f., Fl. Brit. India 3: 285. 1881; Pant in Hajra & al., Fl. India 13: 79. f. 25. 1995.

A. stoliczkai C.B. Clarke, Compos. Ind. 108. 1876; Hook.f., *l.c.* 283.

Perennial, erect, softly woolly herb. Stems many, branched, slender, strict, rigid, pubescent. Leaves spreading, narrowly linear from a broad or narrow base, 1-veined, apiculate at apex, margin flat or recurved. Capitula few to many, campanulate, peduncled, in branched, terminal corymbs, 2–4 mm across; involucral bracts 3 or 4-seriate, scarious, white, outer ones obovate-oblong, inner linear-oblong, obtuse. Florets pale yellow; outer ones female, with filiform corolla; inner florets bisexual, with 5-toothed corolla. Achenes ± rectangular, pitted; pappus hairs white.

Flowering and fruiting: July–September.

Distribution: Pakistan; Himalaya from Kashmir, Himachal Pradesh, Nepal to Bhutan; S. W. Tibet, China.

Specimen examined: Sonamarg: 2900 m, mountain slopes, *G.H. Dar* 7651.

36. **FILAGO** L., Sp. Pl.: 927, 1199, add. post indicem. 1753, nom. cons.

Mostly distributed in the Old World (Eurasia, N. Africa), also in N. America. Species *c.* 46, of which 1 occurs in Sind Valley.

Filago hurdwarica (Wall. ex DC.) Wagenitz in Willdenowia 4: 291. t. 3. 1968; Pant in Hajra & al., Fl. India 13: 44. f. 13. 1995. *Gnaphalium hurdwaricum* Wall. ex DC., Prodr. 6: 231. 1838.

Filago germanica auct non. L. 1753 : C.B. Clarke, Compos. Ind.: 99. 1876; Hook.f., Fl. Brit. India 3: 277. 1881; *F. bornmuelleri* Haussk. ex Bornm., Repert. Spec. November Regni Veg. 18: 40. 1922.

Annual, erect to decumbent, woolly herb; stems branched; branches dichotomous, divaricating. Leaves obovate-spathulate, apex apiculate, base attenuate, margins entire. Capitula in dense globose clusters at terminal forks of branches, surrounded by leafy bracts longer than themselves, glistening, pale yellow, subsessile, 1–2.5 mm across; involucral bracts 3 or 4-seriate, scarious. Outer florets female, filiform, many, corolla ± 2–3-toothed; inner florets bisexual, few, corolla 4–5-toothed. Achenes dimorphic; pappus hairs white.

Flowering and fruiting: May–June.

Distribution: Iran, C. Asia, Afghanistan, Pakistan, Tibet; Himalaya from Kashmir, Himachal Pradesh, Punjab, Uttarakhand to Nepal.

Specimens examined: Beehama, 1700 m, sandy slopes, *G.H. Dar* 1330; Bonzilla, 1900 m, foothills, *G.H. Dar* 4981; Lar, 1800 m, maize fields, *G.H. Dar* 6138.

Notes: A second species - *F. paradoxa* Wagenitz, has been reported from Gulmarg. It differs from the preceding species in its linear-lanceolate leaves and in clusters of capitula not surrounded by leafy bracts. *Filago pyramidata* L., Sp. Pl.: 1199. 1753 [*F. germanica* L. var. *pyramidata* (Gaud.) DC] is also reported from our area by several workers. The treatment of *Filago* in the Flora of India (Pant, 1995: 46), however, does not establish the presence of this species in India.

37. **LOGFIA** Cass., Bull. Sci. Soc. Philom. Paris 1819: 143. 1819.

Distributed in Europe, Siberia, NW. Africa, SW. and C. Asia, and Himalaya. Species 9, of which 1 occurs in Sind Valley.

Logfia arvensis (L.) Holub in Notes Roy. Bot. Gard. Edinb. 33: 432. 1975; Pant in Hajra & al., Fl. India 13: 49. f. 15. 1995. *Filago arvensis* L., Sp. Pl.: 1312. 1753; Hook.f., Fl. Brit. India 3: 277.1881.

Gnaphalium lagopus Willd., 1803; *Filago alpestris* C. Presl, 1822; *Oglifa arvensis* (L.) Cass., 1825.

Annual, erect, woolly; stems diffusely branched from the base. Leaves linear-lanceolate, erect, apex acute, margin entire. Clusters of heads axillary and terminal, surrounded by few leafy bracts shorter than themselves.

Capitula pale whitish, 1–2.5 mm across; involucral bracts 3 or 4-seriate, spreading in fruit, obtuse to subacute, outer ones hyaline. Corolla of outer florets filiform and obscurely toothed, that of inner florets 5-toothed. Achenes oblong, hairy; pappus hairs white.

Flowering and fruiting: May–June.

Distribution: NW. Africa, Europe, Turkey, Iran, Asia Minor, Afghanistan, Pakistan, W. Tibet, W. Himalaya from Kashmir to Himachal Pradesh.

Specimens examined: Beehama: 1700 m, sandy slopes, *G.H. Dar* 2070; Lar: 1800 m, maize fields, *G.H. Dar* 6135; Manigam: 1900 m, *G.H. Dar* 6140.

38. **GNAPHALIUM** L., Sp. Pl.: 850. 1753; Gen. Pl. ed. 5: 368. 1754.

Cosmopolitan in distribution; species c. 80, of which 3 species occur in Sind Valley.

Key to the species

1a. Leaves oblong-spathulate or lanceolate; capitula in corymbose, leafless clusters, golden yellow	1. *G. affine*
1b. Leaves linear; capitula in leafy spikes or clusters, usually pale white	2
2a. Capitula in leafy spikes, c. 2 mm across; florets few	2. *G. stewartii*
2b. Capitula in globose, leafy, terminal clusters, 1–2 mm across; florets numerous	3. *G. thomsonii*

1. **Gnaphalium affine** D. Don, Prodr. Fl. Nepal. 173. 1825..

G. multiceps Wall. ex DC., Prodr. 6: 222. 1838; *G. luteo-album* L. var. *multiceps* (Wall. ex DC.) Hook.f., Fl. Brit. India 3: 288. 1881; *G. luteo-album* L. subsp. *affine* (D. Don) Koster, Blumea 4(3): 484. 1941; Pant in Hajra & al., Fl. India 13: 89. f. 28. 1995; *Pseudognaphalium affine* (D. Don) Anderb., 1991.

Annual woolly herb. Stems erect or ascending, many from the root. Leaves oblong- spathulate, sessile, half-amplexicaul, entire, obtuse, 1-veined, woolly on both the surfaces; upper leaves narrower, lanceolate, acute. Capitula dense, corymbosely arranged in leafless clusters, 2–4 mm across; involucral bracts many-seriate, scarious, ovate or oblong, obtuse. Florets golden-yellow; outer florets female, with filiform, 3 or 4-toothed corolla; central florets bisexual, with 5-toothed corolla. Achenes tubercled or with minute curved bristles; pappus hairs white, falling separately.

Flowering and fruiting: June–September.

Distribution: Pakistan, India, Tibet, Himalaya, Myanmar, Bhutan, Thailand, Indo-China, Indonesia, Java, China, Japan, Sri Lanka, Brazil, Middle and S. Europe, Africa, Australia.

Specimens examined: Shallabugh: 1600 m, borders of paddy fields, *G.H. Dar* 1937 Wayil: 1725 m, moist roadsides, *G.H. Dar* 2982; Beehama: 1650 m, *G.H. Dar* 3114; Ganderbal: 1650 m, borders of paddy fields, *G.H. Dar* 3742.

Notes: Koster (1941) divided *Gnaphalium luteo-album* L., Sp. Pl.: 851.1753, into 2 subspecies: ssp. *luteo-album* [with involucral bracts pale- to dark-brown or reddish-brown], and ssp. *affine* (D. Don) Koster [with involucral bracts citrine to golden-yellow]. As per this view, our specimens belong to ssp. *affine*.

2. **Gnaphalium stewartii** C. B. Clarke ex Hook.f., Fl. Brit. India 3: 289. 1881; Pant in Hajra & al., Fl. India 13: 94. f. 31. 1995.

Perennial, densely cottony herb. Stems tufted, leafy. Leaves linear, sessile, erect or recurved, acute, entire, 3 or 4-veined, densely white tomentose; radical leaves rosulate, densely aggregated into a ± spherical cluster. Capitula axillary, in lax or dense leafy racemes, 2 mm across; involucral bracts 2 or 3-seriate, scarious, linear-oblong, acute to obtuse. Florets pale white; outer florets female, with filiform, ± 3–4-toothed corolla; inner ones bisexual, with 5-toothed corolla. Achenes subsilky or ± scabrid, pappus hairs white, falling separately.

Flowering and fruiting: July–August.

Distribution: Afghanistan, Pakistan, Caucasus, China, Turkey, W. Himalaya from Kashmir to Himachal Pradesh.

Specimen examined: Zoji La: 3600 m, rocky slopes, *G.H. Dar* 7513.

3. **Gnaphalium thomsonii** Hook.f., Fl. Brit. India 3: 290. 1881; Pant in Hajra & al., Fl. India 13: 94. f. 32. 1995. .

G. uliginosum C.B. Clarke, Compos. Ind.: 115. 1876, *non* L.

Perennial, softly cottony herb. Stems simple or many from the root, erect, leafy. Leaves linear-falcate, acute, entire, narrowed to a sessile base. Capitula in sessile, globose terminal clusters, subtended by slender leaves, 1–2 mm across; involucral bracts 3–4-seriate, scarious, linear-oblong, greenish-brown, acute-obtuse. Florets pale white; outer florets female, corolla filiform, 3–4-toothed; central florets bisexual, corolla 5-toothed. Achenes 4-angled, minutely papillose; pappus hairs white.

Flowering and fruiting: June–August.

Distribution: China, Pakistan, W. Himalaya from Kashmir to Himachal Pradesh.

Specimens examined: Sarbal: 2850 m, mountain slopes, *G.H. Dar* 5542; Zoji La: 3400 m, rocky slopes, *G.H. Dar* 5597; Najwan: 2700 m, meadowlands, *G.H. Dar* 6782.

39. **LEONTOPODIUM** R. Br. ex Cass., Bull. Soc. Sci. Philom. Paris 1819: 144. 1819.

Distributed in the mountains of Europe and Asia; species c. 60, of which 1 species occurs in Sind Valley.

Leontopodium alpinum *Cass.* in Dict. Sci. Nat. 25: 474. 1822; Hook.f., Fl. Brit. India 3: 279. 1881, p.p.; Pant in Hajra & al., Fl. India 13: 104. 1995.

Perennial, erect, woolly herb. Flowering stems tufted, slender, leafy, laxly white tomentose. Leaves sessile, entire; basal leaves densely-rosulate, spathulate; cauline ones alternate, linear-spathulate, obtuse. Capitula sessile to shortly peduncled in a terminal cluster with a few spreading leaf-like bracts at its base, discoid, unisexual or bisexual; involucral bracts in 3–4-seriate, scarious. Marginal florets female, with filiform, 4-toothed corolla; central florets bisexual, with tubular, 5-lobed, pale-white corolla. Achenes oblong, ribbed, hairy; pappus hairs white.

Flowering and fruiting: June–August.

Distribution: Europe, Yugoslavia, SW. Bulgaria, Central Asia, and alpine Himalaya from Kashmir, Himachal Pradesh to Nepal.

Specimens examined: Najwan: 2600 m, rocky slopes, *G.H. Dar* 6806; Pranshur: 3400 m, rocky slopes, *G.H. Dar* 8246.

Notes: *Leontopodium leontopodinum* (DC.) Hand.-Mazz., 1927 (*Antennaria leontopodina* DC., 1838), an Eurasiatic species, has been reported from the W. Himalaya, including our area. The status of this species, however, is said to be dubious (see Pant, Flora of India 13: 110-111. 1995).

V. 3 **Tribe Astereae** Cass., 1819.

Cosmopolitan in distribution, but concentrated in the temperate and montane regions.The tribe comprises *c.* 222 genera with *c.* 3100 species; represented in Sind Valley by 8 genera with 16 species.

40. **SOLIDAGO** L., Sp. Pl.: 880. 1753; Gen. Pl. ed. 5: 374. 1754.

Chiefly N. American and Eurasian, also in S. America. Species *c.* 100, 1 of which 1 occurs in Sind Valley.

Solidago virgaurea L., Sp. Pl.: 880. 1753; Hook.f., Fl. Brit. India 3: 245. 1881; Hajra in Hajra & al., Fl. India 12: 144. f. 42. 1995.

Perennial, erect herb. Leaves alternate, petiolate, oblong-lanceolate, pubescent, apex acute to acuminate, margin somewhat toothed, base cuneate; petioles usually winged. Capitula crowded in the axils of upper cauline leaves, 5–15 mm across, radiate; receptacle naked; involucral bracts 3-seriate, unequal, narrow, acute. Florets yellow; ray-florets female, disc-florets hermaphrodite. Achenes cylindrical, ribbed; pappus hairs slender, pale brown.

Flowering and fruiting: July–September.

Distribution: Europe, temperate Asia and America, Hong Kong; Himalaya from Kashmir through Pakistan to C. Nepal.

Specimens examined: Sonamarg, 2700 m, sandy slopes, *G.H. Dar* 3861; Baltal, 2950, 3000 m, *G.H. Dar* 3869, 3888; Pranshur, 3400 m, rocky slopes among *Juniperus squamata, G.H. Dar* 7841; Naranag, 2800 m, mountain slopes, *G.H. Dar* 8842.

41. **ASTER** L., Sp. Pl.: 872. 1753; Gen. Pl. ed. 5: 373. 1754.

Chiefly distributed in N. temperate regions in Eurasia and Africa, also in N. America. Species *c*. 180, represented in Sind Valley by 5 species.

Key to the species

1a.	Involucral bracts usually dry or scarious; capitula small, 1–1.8 cm across	.4. *A. molliusculus*
1b.	Involucral bracts herbaceous; capitula large, 2.5–8 cm across	2
2a.	Plants robust; stems densely leafy	3
2b.	Plants usually not robust; stems sparingly leafy	4
3a.	Ligules 2.5–3.5 cm long, bluish or bluish mauve	2. *A. falconeri*
3b.	Ligules up to 2 cm long, pink or purplish	5. *A. thomsonii*
4a.	Stem leaves 1–3; achenes c. 12 mm long, glabrate	3. *A. flaccidus*
4b.	Stem leaves usually more than 2; achenes c. 3 mm long, very silky	1. *A. diplostephioides*

1. **Aster diplostephioides** (DC.) C.B. Clarke, Compos. Ind.: 45. 1876; Hook. f., Fl. Brit. Ind. 3: 251. 1881; Hajra in Hajra & al., Fl. India 12: 84. f. 24. 1995. *Heterochaeta diplostephioides* DC., Prodr. 5: 282. 1836.

Perennial, erect, villous herb. Stems leafy, simple. Basal leaves oblanceolate, acute or mucronate, nearly entire, base attenuate to petiole, both surfaces hispid and glandular; petioles ± winged; cauline leaves sessile, linear-lanceolate to oblanceolate, acute, base semi-amplexicaul in lower ones. Capitula solitary, large, 4.5–7.5 cm across; involucral bracts 2–3-seriate, linear-lanceolate, acuminate. Ray-florets bluish-purple, female, 30–50, *c*. 3 cm long, shallowly 2–3-toothed; disc-florets yellow, purple at tip, hermaphrodite. Achenes obovate, *c*. 3 mm long, 4-ribbed, silky; pappus double, outer ones wider than inner.

Flowering and fruiting: July–September.

Distribution: Tibetan Plateau, W. to E. alpine Himalaya from Kashmir to Bhutan, SW. China.

Specimens examined: Zoji La: 3600 m, along melting glaciers, *G.H. Dar* 7347; Pranshur: 3800 m, rocky slopes, *G.H. Dar* 8190.

2. **Aster falconeri** (C. B. Clarke) Hutch. in Gard. Chron. ser. 3. 47: 389. 1910; Hajra in Hajra & al., Fl. India 12: 84. 1995. *A. diplostephioides* (DC.) C. B. Clarke var. *falconeri* C.B. Clarke, Compos. Ind.: 45. 1876.

Erigeron falconeri (Clarke) Botsch., 1961.

Perennial, densely leafy, viscid-pubescent herb. Basal leaves oblanceolate or spathulate; cauline leaves oblong-lanceolate, gradually narrowed to the base, distantly toothed, usually silvery-villous. Capitula solitary, large, more than 6 cm across; involucral bracts 2–3-seriate, outer leafy. Ray-florets white at the base, bluish elsewhere; disc-florets orange-yellow. Achenes 3–4 mm long, 4-ribbed, glandular; pappus pale brown.

Flowering and fruiting: July–August.

Distribution: Pakistan, Himalaya from Kashmir to W. Nepal.

Specimens examined: Pranshur ; 3350 m, meadowlands, *G.H. Dar* 7806 ; Nilnai: 3650 m, rocky slopes, *G.H. Dar* 7898, 7903 (KASH , E).

3. **Aster flaccidus** Bunge in Mem. Acad. Sci. St. Petersb. 2: 599. 1835; Hajra in Hajra & al., Fl. India 12: 86. 995.

A. heterochaeta C.B. Clarke, Compos. Ind.: 44. 1876; Hook. f., Fl. Brit. Ind. 3: 250. 1881; *A. tibeticus* Hook.f., *l. c.* 251, p.p.

Perennial, tomentose or woolly herb. Stems absent or, when present, erect and leafy. Basal leaves ± petioled, obovate or oblanceolate, entire, acute or obtuse, attenuate at base; cauline leaves 1–3, sessile, half-amplexicaul, linear-oblong. Capitula solitary up to 4 cm across; involucral bracts 2-seriate. Ray-florets 50–60, bright blue or lilac; disc-florets yellow. Achenes ± obovate, 2-ribbed, brown; pappus in 2 rows, outer smaller.

Flowering and fruiting: July–September.

Distribution: Siberia, Pamir, C. Asia, Tibet; Hindukush Himalaya from Afghanistan, Pakistan, Kashmir through Himachal Pradesh, Nepal, Sikkim, to Arunachal Pradesh and SW. China.

Specimen examined: Pranshur: 4100 m, rocky slopes, *G.H. Dar* 7698.

Notes: It is a variable species, usually divided into subspecific taxa; and includes *A. tibeticus* Hook. f. (represented here by *G.H. Dar* 7344 from Zoji La, 3500 m, and *G.H. Dar* 7874 from Pranshur, 3500 m, on rocky slopes).

4. **Aster molliusculus** (Lindl. ex DC.) C.B. Clarke, Compos. Ind.: 45. 1876; Hook.f., Fl. Brit. Ind. 3: 251. 1881; Hajra in Hajra & al., Fl. India 12: 92. 1995. *Diplopappus molliusculus* Lind1. ex DC., Prodr. 5: 277. 1836; *D. roylei* Lindl. ex DC., *l. c.* 276.

Perennial, pubescent herb. Stems many, leafy, rigid, erect-ascending from a woody rootstock, villous-pubescent. Leaves subsessile, linear-elliptic, obovate-oblong or lanceolate, apex acute, margin entire or remotely toothed, base cuneate, upper surface 3-veined, glabrous or scaberulous. Capitula usually solitary, rarely 2–3, long-peduncled, 1.3–3 cm across; involucral bracts 2–3-seriate, narrow-lanceolate, acuminate. Ray-florets blue-lilac, many, c. 1 cm long; disc-florets yellow, half as long as ligule. Achenes linear, 4-ribbed, c. 3 mm long, silky; pappus white, in 1 or 2 rows.

Flowering and fruiting: June–September.

Distribution: Western Himalaya from Pakistan through Kashmir, Himachal Pradesh to Uttarakhand.

Specimen examined: Sarbal: 3000 m, rocky slopes, *G.H. Dar* 5602.

5. **Aster thomsonii** C.B. Clarke, Comp. Ind. 48. 1876; Hook.f., Fl. Brit. Ind. 3: 252. 1881; Hajra in Hajra & al., Fl. India 12: 96. f. 29. 1995.

Callimeris flexuosus Royle ex DC., Prodr. 5: 258. 1836.

Perennial, erect, villous herb. Stems branched, flexuous. Leaves elliptic-ovate, membranous, subsessile to sessile, apex ± acuminate, margin serrate, base cuneate. Capitula long-peduncled, 2.4–5 cm across; involucral bracts herbaceous, 2–3-seriate, subequal, acuminate. Ray-florets many, pink or purplish, *c.* 1.5 cm long; disc-florets to 5 mm long. Achenes obovate-lanceolate, 2–4-ribbed, pilose; pappus brown, 1–2 mm long.

Flowering and fruiting: August–October.

Distribution: W. Himalaya from Pakistan, through Kashmir to Himachal Pradesh.

Specimen examined: Reported from Sind Valley by *R. R. Stewart* (1972: 723).

42. **BELLIS** L., Sp. Pl.: 886. 1753; Gen. Pl. ed. 5: 378. 1754.

Distributed chiefly in Europe and Mediterranean region; species *c.* 8, of which 1 occurs in Sind Valley.

Bellis perennis L., Sp. Pl.: 886. 1753; Hajra in Hajra & al., Fl. India 12: 146. 1995.

Perennial, scapigerous herb. Leaves all radical, spathulate or obovate, narrowed into margined petioles, pubescent, margin slightly toothed. Capitula solitary, 2.5 cm across, on hairy peduncles; involucral bracts oblong, pubescent. Ray-florets numerous, linear; ligule white or rose, incurved.

Flowering and fruiting: March–April.

Distribution: A native of W. Europe, grown in flower gardens and naturalized at many places.

Specimen examined: Beehama: 1650 m, roadsides, *G.H. Dar* 473.

Notes: Although reported under cultivated species in Fl. India (12: 146. 1995), it occurs as a common spring flower in the study area, may be as an escape.

43. **BRACHYACTIS** Ledeb., Fl. Ross. 2: 495. 1846.

North American, Central Asian, Siberian and Himalayan in distribution; species *c.* 6, of which 3 occur in Sind Valley. The genus is now included in *Symphyotrichum* Nees. Gen. Sp. Aster. 135. 1832, which has *c.* 90 species, mostly in N. America.

Key to the species

1a.	Leaves narrowly-ovate to oblong-lanceolate; perennial herbs	1. *B. anomala*
1b.	Leaves obovate; annual herbs	2
2a.	Leaf margin toothed; involucral bracts 2–3-seriate, 4–5 mm long	2. *B. pubescens*
2b.	Leaf margin lobulate; involucral bracts 2-seriate, c. 3 mm long	3. *B. roylei*

1. **Brachyactis anomala** (DC.) Kitam. in Fl. E. Himal. 3: 113. 1975; Hajra in Hajra & al., Fl. India 12: 101. 1995, as *'anomalum'. Erigeron anomalum* DC., Prodr.5: 293. 1836.

Brachyactis menthodora Benth. in Hook., Icon. Pl. 12. t. 1106. 1872; Hook.f., Fl. Brit. Ind. 3: 253.1881.

Perennial aromatic herb. Stems erect, branched, glandular-pubescent. Leaves narrowly ovate to oblong-lanceolate, lower petioled with a winged base decurrent to stem, upper sessile and half-amplexicaul, apex obtuse to acute, margin coarsely serrate, base tapering. Capitula solitary or several in terminal corymbs, (0.5–) 1–1.5 cm across; involucral bracts herbaceous, 2–3-seriate, linear-lanceolate. Ray-florets pale blue to white, female; disc-florets hermaphrodite. Achenes ± obovoid; pappus reddish or dirty white, 3–5 mm long.

Flowering and fruiting: August–October.

Distribution: S. Tibet, W. to E. Himalaya from Kashmir, Nepal to Sikkim.

Specimen examined: Sind Valley, 4000 m, *Clarke* 30997A.

2. **Brachyactis pubescens** (DC.) Aitch. & C.B. Clarke in J. Linn. Soc., Bot. 18: 68. 1881; Hajra in Hajra & al., Fl. India 12: 101. 1995. *Conyza pubescens* DC., Prodr. 5: 381. 1836.

Brachyactis robusta Benth., 1872; Hook.f., *l.c.* 254.

Annual, erect, glandular-pubescent. Stems stout, branched. Leaves obovate, margin toothed, base narrowed into a short petiole. Receptacle broad; capitula in racemes, 8–15 mm across; involucral bracts 2–3-seriate, oblong, subequal. Ray-florets whitish, female, in many rows, filiform; disc-florets hermaphrodite. Achenes obovate-lanceolate, pubescent; pappus white or brownish, 3–5 mm long.

Flowering and fruiting: May–August.

Distribution: Afghanistan, Pakistan, W. Tibet, Western Himalaya from Kashmir to Kumaon and Garhwal, Nepal.

Specimens examined: Beehama: 1750 m, foothills, *G.H. Dar* 1245; Sonamarg: 2700 m, *G.H. Dar* 8672.

3. **Brachyactis roylei** (DC.) Wendelbo in Nytt Mag. Bot., Oslo 1: 62. 1952; Hajra in Hajra & al., Fl. India 12: 101. 1995. *Conyza roylei* DC., Prodr. 5: 381. 1836.

Brachyactis umbrosa Benth., 1872; Hook.f., *l.c.* 253. *B. wanqtuensis* C.B. Clarke, 1876; *Conyza umbrosa* Kar. & Kir., 1845.

Annual, glandular-pubescent; stems branched all along, leafy. Leaves obovate, pubescent on both surfaces, margin lobulate, base cuneate. Capitula many, axillary, 8–12 mm across, sessile or long-peduncled; involucral bracts 2-seriate. Ray-florets in many rows, filiform, with minute ligule. Achenes obovate, ± silky; pappus reddish or whitish, 4–5 mm long.

Flowering and fruiting: August–September.

Distribution: Afghanistan, Karakoram (Pakistan), C. Asia, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal.

Specimen examined: Sonamarg, R. R. Stewart 6744.

44. **CONYZA** Less., Syn. Gen. Comp. 203. 1832, *nom. cons., non* L. 1753.

Distributed in temperate and subtropical regions of the world; species 60–100, of which 2 species occur in Sind Valley.

Key to the species

1a. Leaves narrow-linear, mostly 3–5 mm wide and entire; capitula 4–5 mm across; pappus hairs dirty white; plants dark-green 2. C. *canadensis*

1b. Leaves oblanceolate or linear-lanceolate, mostly 5–15 mm wide and serrate-dentate to pinnatifid; capitula 5–10 mm across; pappus hairs brownish; plants grayish-green 1. *C. bonariensis*

1. **Conyza bonariensis** (L.) Cronquist in Bull. Torrey Bot. Club 70: 632. 1943; Hajra in Hajra & al., Fl. India 12: 104. 1995. *Erigeron bonariensis* L., Sp. Pl.: 863. 1753; Hook.f., Fl. Brit. India 3: 254. 1881. *Shalla Loth*

Erigeron crispus Pourr., 1788; E. linifolius Willd., 1803; *Conyza ambigua* DC., 1815.

Annual, stout, grayish-green, hirsute herb. Stems much branching above ground or with several erect, leafy stems from the base. Lower leaves narrowly oblanceolate, 6–12(–20) x 0.5–1.5(–2.5) cm, attenuate at the base, acute at the apex, margin coarsely serrate-dentate or pinnatifid with up to 6 teeth or lobes on each side, pubescent on both surfaces; upper leaves smaller, linear-lanceolate, ± entire-margined. Capitula in loose, erect, leafy panicles, 5–10 mm across; involucral bracts densely pubescent. Ray-florets yellowish, female; disc-florets pale-yellow, bisexual. Pappus hairs brownish.

Flowering and fruiting: June–October.

Distribution: Native of S. America, introduced into S. Europe, Afghanistan, Pakistan, India, Sri Lanka, Nepal, Bhutan and in other countries with ± Mediterranean type of climate.

Specimen examined: Beehama: 1700 m, weed of cultivation, *G.H. Dar* 3109.

2. **Conyza canadensis** (L.) Cronquist in Bull. Torrey Bot. Club 70: 632. 1943; Hajra in Hajra & al., Fl. India 12: 105. 1995. *Erigeron canadensis* L., Sp. Pl.: 863. 1753; Hook.f., Fl. Brit. India 3: 254. 1881. *Shalla Loth*.

Annual, very slender, dark-green, hirsute-pubescent. Stems much branched above, densely leafy. Leaves narrow-linear or linear-oblong, sessile, 4–8 x 0.3–0.5 cm, mostly entire or with a few indistinct apical teeth, densely pubescent, apex obtuse. Capitula peduncled, in elongated, branched panicles, 4–5 mm across; involucral bracts narrow, acuminate, hirsute. Ray-florets whitish, female; disc-florets pale yellow, bisexual. Pappus hairs dirty white.

Flowering and fruiting: March–October.

Distribution: Native of N. America, now a cosmopolitan weed.

Specimens examined: Beehama: 1650 m, along paddy fields, *G.H. Dar* 367; Doderhama: 1650 m, weed of cult., *G.H. Dar* 513; Nunar: 1700 m, maize fields, *G.H. Dar* 1041; Ganderbal: 1650 m, *s.n.*; Wayil: 1725 m, *G.H. Dar* 2114; Tulmulla:1650 m, veg. fields, *G.H. Dar* 2159; Shallabugh: 1600 m, *G.H. Dar* 2641.

45. **ERIGERON** L., Sp. Pl.: 863. 1753; Gen. Pl. ed. 5: 371. 1754.

Nearly cosmopolitan, chiefly N. American; species c. 400, of which 2 species occur in Sind Valley.

Key to the species

1a. Capitula trimorphic, with ligulate florets, tubular female florets and tubular hermaphrodite florets 1. *E. acer*

1b. Capitula dimorphic, with ligulate florets and tubular hermaphrodite florets 2. *E. angustissimus*

1. **Erigeron acer** L., Sp. Pl.: 863. 1753, *'acre'*; Hook.f., Fl. Brit. India 3: 255. 188 (as synonym under *E. alpinus*); Hajra in Hajra & al., Fl. India 12: 117. 1995.

Biennial to perennial hairy herb. Basal leaves petioled, spreading, obovate or oblong, margin entire or serrate; cauline leaves sessile above, oblong to lanceolate. Capitula in corymbs or panicles, 1–2 cm across;

involucral bracts 2–3-seriate, subulate-lanceolate, glandular or hirsute. Florets trimorphic; ligules purplish to light blue, longer than the pappus; female florets eligulate. Achenes oblanceolate, *c.* 2 mm long, scantily pubescent.

It is a very variable species, variously treated in local floristic accounts; most often misidentified as *E. alpinus* L., which is a European species. Collections of this taxon made from the Sind Valley belong to 3 varieties:

1a.	Plants usually densely hirsute with crispate hairs	1.1. var. *acer*
1b.	Plants not densely hirsute with crispate hairs	2
2a.	Stems usually unbranched below; pappus hairs numerous	1.2. var. *khasiana*
2b.	Stems much branched from the base; pappus hairs scanty	1.3. var. *multicaulis*

1.1 **Erigeron acer** L. var. **acer**

Flowering and fruiting: June–September.

Distribution: Eurasia, China, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal.

Specimens examined: Baltal : 2900 m, rocky slopes, *G.H. Dar* 3961; Sonamarg: 2700 m, banks of Sind river, *G.H. Dar* 8711.

1.2 **Erigeron acer** L. var. **khasiana** (Hook.f.) Hajra in Hajra & al., Fl. India 12: 118. 1995. *E. alpinus* var. *khasiana* Hook.f., Fl. Brit. India 3: 255.1881.

Perennial, erect, hairy herb. Stems usually unbranched below. Basal leaves very crowded, obovate-lanceolate; cauline leaves sessile. Capitula few, peduncled; ligules blue, twice as long as the red, rather copious pappus.

Flowering and fruiting: July–September.

Distribution: Kashmir, Khasiya hills (Meghalaya), Bhutan.

Specimen examined: Beehama: 1700 m, foothills, *G.H. Dar* 2272.

1.3 **Erigeron acer** L. var. **multicaulis** (Wall. ex DC.) C.B. Clarke, Compos. Ind.: 53. 187. 1876; Hajra in Hajra & al., Fl. India 12: 118. 1995. *E. multicaulis* Wall. ex DC. Prodr. 5: 292. 1836.

E. alpinus var. *multicaulis* (Wall. ex DC.) Hook.f., Fl. Brit. India 3: 255. 1881. Perennial, sparsely hairy herb. Stems caespitose, much branched from the base, branches slender. Leaves as in the preceding variety. Capitula rather small, usually long-peduncled, corymbose. Rays blue-purple; pappus hairs scanty, shorter ones very few.

Flowering and fruiting: July–September

Distribution: Afghanistan, Pakistan, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Bhutan, and W. Tibet.

Specimens examined: Beehama: 1700 m, foothills, *G.H. Dar* 2977; Baltal: 3000 m, rocky slopes, *G.H. Dar* 4098; Naranag: 2300 m, forest floor, *G.H. Dar* 4128; Gagangir: 2300 m, maize fields, *G.H. Dar* 8772.

2. **Erigeron angustissimus** Lindl. ex DC., Prodr. 5: 286. 1836; Hook.f., Fl. Brit. India 3: 156. 1881 (under doubtful species); Hajra in Hajra & al., Fl. India 12: 118. 1995.

Perennial herb. Stems much branched from a woody base, branches ascending, naked apically. Leaves linear, entire, glabrous. Capitula solitary terminal; involucre of scaly, linear acuminate bracts, shorter than disc, inner bracts with margins membranous. Ligules blue, in 2 rows, narrow linear. Achenes villous.

Flowering and fruiting: August–September.

Distribution: Himalaya from Pakistan to Kashmir.

Specimen examined: Sind Valley, *L. & S.* 7947.

46. **PSYCHROGETON** Boiss., Fl. Orient. 3: 156. 1875.

Distributed chiefly in Iran, Afghanistan, Pakistan, Turkestan, Pamir-Hindukush, and China. Species c. 20, of which 1 occurs in Sind Valley.

Psychrogeton andryaloides (DC.) Novopokr. ex Krasch. in Acta Inst. Bot. Acad. Sci. U.R.S.S. Ser. 1. Fasc. 3: 343.1937; Hajra in Hajra & al., Fl. India 12: 138. 1995. *Conyza andryaloides* DC. Prodr. 5: 377. 1836; *Erigeron andryaloides* (DC.) Benth. ex C.B. Clarke, Compos. Ind.: 52. 1876; Hook.f., Fl. Brit. India 3: 255. 1881. *E. stenodon* Rech. f., 1955.

Perennial, densely tomentose or woolly herb, with stout woody rootstock. Leaves densely crowded, petioled, spathulate, margin entire or slightly lobulate. Capitula on naked scape-like stems which bear 1 or 2 small linear leaves or none at all, 1.2–1.5 cm across; involucral bracts linear. Ligules cream white to yellow, short and broad, revolute. Achenes flat, narrow, silky; pappus in 1 row, white, finally reddish.

Flowering and fruiting: June–August.

Distribution: Afghanistan, Tibet, temperate and alpine Himalaya from Kashmir, Himachal Pradesh to Uttarakhand.

Specimen examined: Pranshur: 3400 m, rocky cliffs, *G.H. Dar* 8283.

Notes: A variable species, usually divided into several varieties. The glabrous-glandular form has been named as var. *denudatus,* the form with white rays is the type var. (*andryaloides*), while the one with yellow rays is called var. *poncinsii*.

47. **MYRIACTIS** Less., in Linnaea 6: 127.1831.

Distributed in tropical America, E. Asia, Indonesia, and Philippines. Species 2, of which 1 occurs in Sind Valley.

Myriactis nepalensis Less. in Linnaea 6: 128. t. 2. 1831; Hook. f., Fl. Brit. Ind. 3: 247.1881; Hajra in Hajra & al., Fl. India 12: 134. 1995.

Annual erect herb. Stems glabrous or hispid, ribbed. Leaves sessile to subsessile, ovate or lanceolate, apex acute, margin coarsely serrate, base tapering and ± dilated. Capitula solitary or several in terminal corymbs on lateral or main branches, hemispheric, 5–8 mm across, minutely radiate, receptacle convex, naked; involucral bracts 3–4-seriate, unequal. Ray-florets white, in many rows, female; disc-florets yellow, few, hermaphrodite. Achenes flat, smooth; pappus none.

Flowering and fruiting: July–September.

Distribution: Caucasus, Iran, Turkestan, Afghanistan, Himalaya from Kashmir to Sikkim, W. China, Thailand, Indochina, Indonesia.

Specimens examined: Ganderbal: 1650 m, moist and shady situations, *G.H. Dar* 2853; Beehama: 1650 m, in willow plantations, *G.H. Dar* 3185.

V.4 **Tribe Anthemideae** Cass., 1819.

Distributed mostly in the Old world, especially in the Mediterranean region and N. & S. Africa, with fewer species in N. America and Australia, this tribe comprises *c.* 111 genera with *c*. 1800 species. Represented in Sind Valley by 10 genera with 24 species.

48. **ALLARDIA** Decne. in Jacquem., Voy. Inde, Bot. 4: 87. 1844.

Waldheimia Kar. & Kir. in Bull. Soc. Nat. Mosc. 15: 125. 1842.

Distributed in the Central Asia and Hindukush-Himalaya from China, Afghanistan, Pakistan, Kashmir to Nepal. Species c. 8, of which 1 occurs in Sind Valley.

Allardia tomentosa Decne. in Jacq. Voy. Inde, Bot. 4: 87. t. 95. 1844. Hook.f., Fl. Brit. India 3: 313. 1881.

Waldheima tomentosa (Decne.) Regel, in Acta Horti Petrop. 6: 308. 1879; Kar. & Kir. in Hajra & al., Fl. India 12: 72. 1995.

Perennial, loosely tufted, strongly aromatic herb, covered all over with soft, white wool. Branches ascending, naked above. Leaves shortly petioled, oblong, (1–) 2-pinnatifid to pinnatisect; segments oblong-linear, mucronulate. Capitula solitary, terminal, peduncled, (3–) 4–7 cm across. Involucral bracts 3–4-seriate, woolly with brown scarious margins. Ray-florets fertile, with rose (rarely white) 2-fid ligules. Disc-florets bisexual, narrowly tubular, with yellow 5-lobed corolla. Achenes cylindrical, ribbed and wrinkled; pappus bristles linear.

Flowering and fruiting: July–September.

Distribution: C. Asia (Tian-Shan, Pamir Alai), Afghanistan, Pakistan (Chitral, Karakoram, Gilgit, Baltistan), alpine Himalaya from Kashmir, Himachal Pradesh, Uttarakhand to Nepal.

Specimen examined: Pranshur: 4000 m, rocky slopes at the Pass, *G.H. Dar* 7956.

49. **TANACETUM** L., Sp. Pl.: 843. 1753. p. p.; Gen. Pl. ed. 5: 366. 1754.

Distributed mainly in Europe and temperate Asia and N. Africa, also in N. America. Species *c*. 160, of which 2 species occur in Sind Valley.

Key to the species

1a.	Capitula disciform, with all florets tubular, 2-5 mm across	1. *T. falconeri*
1b.	Capitula radiate, with marginal ray- and central disc-florets, 10-18 mm across	2. *T. griffithii*

1. **Tanacetum falconeri** Hook.f., Fl. Brit. India 3: 320. 1881; Naithani in Hajra & al., Fl. India 12: 61. f. 17. 1995.

Perennial, silky tomentose or hoary, erect herb arising from a woody rootstock. Stems stout, sulcate, grooved. Radical leaves petiolate, not overtopping the flowers, linear-oblong, 2-pinnatisect; ultimate segments narrowly-linear, acute; cauline leaves with increasingly shorter petioles. Capitula disciform, in terminal branched corymbs, peduncled, 2–5 mm across. Involucral bracts 4-seriate, linear-oblong, densely pubescent, with narrowly-scarious margins. Ray-florets absent. Disc-florets yellow, bisexual, with 5-toothed corolla. Achenes pale-brown, linear-oblong, glandular; pappus a corona.

Flowering and fruiting: July–September.

Distribution: Pakistan, China (W. Xizang), W. Himalaya from Kashmir to Himachal Pradesh.

Specimen examined: Pranshur: 4000 m, mountain slopes, *G.H. Dar* 8180.

2. **Tanacetum griffithii** (C. B. Clarke) Muradyan in Biol. Zhurn. Armen. 23 (2): 90. 1970. *Chrysanthemum griffithii* C.B. Clarke, Compos. Ind.: 148. 1876.

Matricaria spathipappus C. Winkl., 1887; *Pyrethrum griffithii* (C. B. Clarke) Buser, 1888; *Spathipappus griffithii* (C. B. Clarke) Tzvelev, 1961.

Suffruticose viscid shrublet, with several arachnoid-hairy stems arising from a woody rootstock. Radical leaves petiolate, not overtopping the flowers, oblong to oblong-ovate, 2–3-pinnatisect; ultimate segments linear, 0.5–1 mm wide, mucronulate; uppermost cauline leaves sessile, reduced, linear and entire. Capitula radiate, solitary terminal, 10–15 (–18) mm across. Involucral bracts 3–4-seriate; outer triangular-lanceolate, densely whitish-pubescent, with dark scarious margins. Ray-florets female, sterile, with 3-dentate white ligule. Disc-florets yellow, bisexual, with 5-toothed corolla. Achenes narrowly obconical, ± curved, punctate-glandular; pappus a corona.

Flowering and fruiting: July–August.

Distribution: C. Asia, China (Xizang), Hindukush-Himalaya from Afghanistan, Pakistan, Ladakh to Kashmir.

Specimen examined: Matayan, Ladakh road near Zoji La, ± 3333 m, *R. R. Stewart* 9973 (K).

Notes: This species is not included in Flora of India (Naithani in Hajra & al., Fl. India 12: 68. 1995).

50. **HIPPOLYTIA** Poljakov in Bot. Mater. Gerb. Bot. Inst. V. A. Komarova Akad. Nauk S.S.S.R. 18: 288. 1957.

Tanacetum L. Sect. Hippolytia (Polijakov) Podlech in Rec. f., Fl. Iran. Comp. IV. 158:132. 1986.

Distributed in C. Asia, Mongolia, China, Afghanistan, Pakistan and Himalaya; species *c*. 19, of which 1 occurs in Sind Valley.

Hippolytia dolichophylla (Kitam.) Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) 23(2): 106. 1993. *Chrysanthemum dolichophyllum* Kitam. in Acta Phytotax. Geobot. Kyoto 23:73. 1968.

Tanacetum dolichophyllum (Kitam.) Kitam. in Hara & al., Enum. Fl. Pl. Nepal 3:45.1982; Naithani in Hajra & al., Fl. India 12: 60. 1995*; T. longifolium* Wall. ex DC., Prodr. 6: 130. 1838 p.p. non Thunb., 1800; Hook.f., Fl. Brit. India 3: 320. 1881; *Chrysanthemum longifolium* (Wall. ex DC.) Rech. f., 1955; *Hippolytia longifolium* (Wall. ex DC.) Polijakov, 1961.

Perennial, laxly villous herb, with a woody rootstock covered with withered leaf bases. Stems sulcate, streaked, not angled, densely hairy upwards. Leaves mostly basal, far overtopping the flowers, petiolate, slender, linear-lanceolate, 2–3-pinnatisect; ultimate segments almost filiform; middle and upper cauline leaves gradually smaller and sessile. Capitula in close, woolly, terminal corymbs or rounded clusters, 5–6 (–10) mm across, discoid. Involucral bracts narrowly oblong, hairy, with a broad-membranous purple margin. All florets yellow, bisexual, tubular with 5-fid limb. Achenes narrowly obovoid, brown, with 5 strong ribs; pappus absent.

Flowering and fruiting: July–September.

Distribution: China (Szechuan), Himalaya from Pakistan, Kashmir, Himachal Pradesh, Uttarakhand to C. Nepal.

Specimen examined: Pranshur: 4000 m, mountain slopes, *G.H. Dar* 8173.

51. **ARTEMISIA** L., Sp. Pl.: 848. 1753; Gen. Pl. ed. 5: 367. 1754.

Distributed in N. temperate regions; a few species in N. & S. Africa, S. America, and Pacific Islands, but absent in Australia. Species *c*. 525, represented in Sind Valley by 14 species.

Key to the species

1a. Leaves simple, undivided, looking like those of a willow 5. *A. amygdalina*
1b. Leaves shallowly to deeply divided 1–3 times 2

2a. Disc-florets functionally male, with rudimentary ovaries; styles shorter than corolla 3
2b. Disc-florets fertile, with well-developed ovaries; styles equalling or longer than corolla 4

3a. Basal and lower cauline leaves oblong-obovate to flabellate, cuneate and dentate incised; capitula 2–3 mm across; florets 12–15 per head; branches ± stout 1. *A. japonica*
3b. Basal and lower cauline leaves ovate-orbicular, not cuneate, 2(–3)-pinnatisect; capitula 1.5 mm across; florets usually 10–12 per head; branches almost capillary 2. *A. scoparia*

4a. Receptacle densely to laxly long-hairy 5
4b. Receptacle glabrous 7

5a. Annual or biennial herbs; lower leaves broadly triangular-ovate; capitula 6–7 (–8) mm across; involucral bracts 4–5-seriate; achenes finely striate 3. *A. sieversiana*
5b. Perennial herbs; lower leaves oblong-obovate to broadly ovate; capitula 3–5 mm across; involucral bracts 3 or 4-seriate; achenes smooth 6

6a. Stems ± punctate-glandular; petioles up to 10 cm long; lamina 8–15 × 4–8 cm, 2–3-pinnatisect into 4–10 × 2–4 mm ultimate segments; disc-floret corolla glabrous 6. *A. absinthium*
6b. Stems not punctate-glandular; petioles up to 1.5 cm long; lamina 1.2–4.5 × 0.8–2 cm, 3-pinnatisect into 1.5–2.5 × 0.5–1 mm ultimate segments; disc-floret corolla long-hairy at apex 4. *A. persica*

7a. Annual or biennial herbs; capitula sessile, congested in a very dense axillary thyrsoid panicle, looking like the inflorescence of an amaranth 11. *A. biennis*
7b. Perennial herbs to suffruticose shrublets; capitula pedunculate to subsessile, not densely congested into a thyrse 8

8a. Ultimate leaf-segments (1.5–) 2 mm or more wide 9
8b. Ultimate leaf-segments less than 1.5 mm wide 12

9a. Capitula 4–6 mm across, purplish, in interrupted contracted raceme-like panicles; petioles up to 6 cm long; lamina deeply 2-pinnatipartite; achenes 1.75–2 mm long 9. *A. moorcroftiana*
9b. Capitula 2–3 mm across, yellow or purple-tinged, panicles not interrupted as above; petioles short or ± lacking; lamina 1–2-pinnatisect; achenes up to 1.25 mm long 10

10a. Leaves 1-pinnatisect; panicle broad, usually 10 cm or more wide; involucral bracts grayish-arachnoid hairy on outside 7. *A. vulgaris*
10b. Leaves 2-pinnatisect; panicle narrow, up to 10 cm or less wide; involucral bracts hairy as above or glabrous on outside 11

11a. Involucral bracts in 3–4 rows, glabrous outside; ultimate leaf-segments 15–25 × 4–6 mm, acutely-serrate; capitula yellow; stems greenish 8. *A. incisa*
11b. Involucral bracts in 4 rows, arachnoid-hairy outside, purplish-tinged; ultimate leaf-segments 4–5 × c. 2 mm, acute-acuminate; capitula purple-brown tinged as are the stems 10. *A. roxburghiana*

12a. Disc-floret corolla long-hairy at apex; leaves 3-pinnatisect, with 1.5–2.5 mm long ultimate segments, densely pubescent on both surfaces 4. *A. persica*
12b. Disc-floret corolla not hairy at apex; leaves 2–3-pinnatisect, with usually more than 3 mm long ultimate segments, pitted-glandular on upper surface, densely pubescent beneath 13

13a. Leaves without basal auricles; involucral bracts ± glabrous 12. *A. laciniata*
13b. Leaves with basal auricles; involucral bracts strigose-hoary or sparsely hairy 14

14a. Lower leaves oblong-ovate, 2-pinnatisect, punctate-glandular on upper surface; capitula subglobose, 2.5–3 mm across; involucral bracts 4 or 5-seriate, outermost triangular-ovate, ± scarious-margined; receptacle conical 13. *A. gmelinii*
14b. Lower leaves triangular-ovate, 3-pinnatisect, not glandular on upper surface; capitula ± globose, 3–5 mm across; involucral bracts 3-seriate, outermost linear-oblong, not scarious-margined; receptacle convex 14. *A. santolinifolia*

1. **Artemisia japonica** Thunb., Fl. Japon.: 310. 1784; Naithani in Hajra & al., Fl. India 12: 28. f. 10. 1995.

A. parviflora Roxb. ex D. Don, Prodr. Fl. Nepal. 181. 1825; Roxb., Fl. Ind. ed. 2, 3: 420. 1832; C.B. Clarke, Compos. Ind.: 159. 1876; Hook.f., Fl. Brit. India 3: 322. 1881; *A. glabrata* DC. 1834; *A. cuneifolia* DC. 1837; *A. japonica* var. *parviflora* (Roxb. ex D. Don) Pamp. 1927; *Oligosporus japonicus* (Thunb.) Polijakov 1061; *O. parviflorus* (Buch.-Ham. ex Roxb.) Polijakov 1961.

Perennial herb, to 1 m high, with a woody rootstock and ± grooved stems. Leaves oblong-obovate to flabellate, cuneate; basal and lower stem leaves dentate to incised; middle and upper stem leaves usually with auricles at base, palmatifid to palmatisect into narrow, acute ultimate segments. Capitula yellow, numerous, secund in panicled racemes, broadly ovate to ± globose, 2–3 mm across, nodding, heterogamous. Involucral bracts 3 or 4-seriate, glabrous, with white scarious margins. Florets 12–15; marginal ones female, fertile, with tubular, 2-dentate corolla; disc-florets functionally male, with tubular, 5-toothed, glandular corolla. Achenes dark-brown, oblanceolate, *c.* 1 mm long, smooth.

Flowering and fruiting: July–September.

Distribution: Japan, Korea, China, E. Soviet Union, E. Afghanistan, Pakistan, Nepal and India (in several States from Kerala to Ladakh).

Specimens examined: Baltal: upper Sind Valley, 2121–2727 m, *T. Thomson* s. n. (K); Sonamarg: 3030 m, *R. R. Stewart* 6640 (RAW, PH); Baltal to Nunar, 15-16 October, 1856, *Schlagintweit* Cat. No. 4769 (M); Wusan: 1750 m, dry slopes, *G.H. Dar* 3795; Matayan: road from Drass to Zoji La, 2727–3030 m, *T. Thomson* s. n. (K).

Notes: An aromatic species with very variable leaves, occurring from alpines in Ladakh lower down to the Kashmir Valley. Its oblong-obovate to flabellate lower leaves with cuneate bases and dentate-incised apices are the chief distinguishing characters.

2. **Artemisia scoparia** Waldst. & Kit., Descr. Icon. Pl. Hung. 1: 66, t. 65. 1802; Hook.f., Fl. Brit. India 3: 323.1881.

Biennial or perennial, glabrous to ± villous herb, with a woody rootstock. Stems much branched upwards; branches almost capillary, grooved, purplish-brown. Basal leaves petiolate, ovate-orbicular, 2(–3)-pinnatisect into linear or setaceous segments; cauline leaves subsessile to sessile, auriculate, pinnatisect; the uppermost ones in the floral region acicular. Capitula yellow, numerous, secund in slender panicles, oblong-globose, *c.* 2 × 1.5 mm, nodding. Involucral bracts 3 or 4-seriate, glabrous, with white scarious margins. Florets 10–-12; marginal ones female, fertile, with tubular, 2-dentate corolla; disc-florets functionally male, with tubular, 5-toothed, glandular corolla. Achenes brown, oblong-ovate, 0.8 mm long.

Flowering and fruiting: July–September.

Distribution: C. & E. Europe, Iraq, Turkey, Iran, Afghanistan, China, Mongolia, Russia, Pakistan, Himalaya from Kashmir to C. Nepal.

Specimens examined: Sarich: 1700 m, maize fields, *G.H. Dar* 2987; Cherwan: 1900 m, maize fields, *G.H. Dar* 6012.

3. **Artemisia sieversiana** Ehrh. in Willd., Sp. Pl. 3: 1845. 1804; C.B. Clarke, Compos. Ind. 165.1876; Hook.f., Fl. Brit. India 3: 329. 1881; Naithani in Hajra & al., Fl. India 12: 41. f. 15. 1995.

Absinthium sieversianum Besser, 1829; *A. scaposa* Kitag., 1935.

Annual or biennial canescent herb to 1 m tall, with ± grooved stems. Leaves petiolate, appressedly hairy on both surfaces; lower leaves broadly triangular-ovate, mostly 3-pinnatisect into linear-oblong segments, gradually becoming entire upwards. Capitula bracteate, in panicled racemes, pedunculate, remote, hemispherical, nodding, 6–7 (–8) mm across. Involucral bracts 4–5-seriate, with scarious margins; receptacle densely long-hairy. Florets yellow, numerous; marginal ones female, fertile, with tubular, 2-dentate, glandulose corolla; disc-florets bisexual, fertile, with tubular, 5-toothed glandulose corolla and aristate anthers. Achenes brown, oblanceolate, 1–1.5 mm long, minutely striate.

Flowering and fruiting: July–September.

Distribution: Baltic and C. Asia, Siberia, Mongolia, China, Tibet, NE. Afghanistan, Pakistan and NW. India.

Specimens examined: Lower Sind Valley, ± 1818 m, Sept. 7, 1922, *R. R. Stewart* s. n. (K); Sind Valley: Haknar, borders of maize fields, 2100 m, *G.H. Dar* 8560; Baltal, ± 2727 m, 28.8.1922, *R. R. Stewart* 7573 (PH); Ibid., 2878 m, 20.8.1928, *R. R. Stewart* 9922 (PH).

4. **Artemisia persica** Boiss., Diagn. Pl. Or. Nov. Ser. 1(6): 91. 1846; Hook.f., Fl. Brit. India 3: 327.1881; Naithani in Hajra & al., Fl. India 12: 37. 1995.

A. subspinescens Boiss., *l. c.* 91; *A. persica Boiss.* var. *subspinescens* (Boiss.) Boiss., Fl. Or. 374. 1875; *A. sacrorum* Ledeb. var. *minor* Ledeb. f. *wallichiana* Pamp. subf. *vestita* Pamp., 1927 p.p.

Perennial, erect, grayish-tomentose shrublet with a woody rootstock. Stems many, branched upwards, densely leafy. Basal and lower cauline leaves petioled, 3-pinnatisect, primary segments ascending-spreading, ultimate segments linear-oblong to lanceolate, obtuse; upper cauline leaves sessile and gradually smaller till bract-like and entire in the floral region. Capitula numerous, peduncled, ± distant, secund nodding in long axillary racemes, subglobose, 3–4 mm long and broad. Involucral bracts 3 or 4-seriate, ± keeled; outer linear-oblong; inner elliptic, with scarious margins. Florets 40–50, all fertile; marginal ones female, with compressed, punctate-glandular 2-toothed corolla and exserted style branches; disc-florets yellow, bisexual, cupular, with corolla tube ± punctate-glandular basally and 5-toothed and long-hairy apically. Achenes oblong, c. 1 mm long, smooth.

Distribution: Ladakh, Kashmir to Uttarakhand, Iran, Tian Shan & Pamir Alai, Afghanistan, Tibet, Hindukush-Himalaya from Chitral (Pakistan).

Specimen examined: Zoji La to Metsihoi, 3030 m, August 29, 1922, R.R. Stewart 7574 (PH, K).

5. **Artemisia absinthium** L., Sp. Pl.: 848. 1753; Hook.f., Fl. Brit. India 3: 328.1881; *Naithani* in Hajra & al., Fl. India 12: 11. f. 3. 1995. *Tethwan*.

Perennial, aromatic, hoary-pubescent herb, with an upright rootstock. Stems branched upwards, terete, angular and ribbed, ± densely leafy. Basal leaves long-petioled, unequally 2–3-pinnatisect into spreading, linear-oblong to oblanceolate, obtuse segments, hoary on both surfaces; cauline leaves short-petioled or subsessile, with fewer ± lanceolate acute lobes; the uppermost in floral region sessile, 3-fid or entire. Capitula yellow, numerous, compact, short-stalked, depressed-globose, 2.5–3.5 x 3–-5 mm, nodding, arising from the axils of leaf-like bracts in dense secund racemes terminating the branches. Involucral bracts 3 or 4-seriate; outer ones linear-oblong, green, hoary; inner bracts ovate-orbicular, mostly scarious. Florets numerous, all fertile; marginal ones female, with obliquely 2-toothed corolla and exserted style branches; disc-florets bisexual, with campanulate, 5-toothed corolla and acuminate anthers. Achenes elliptic-oblong to obovoid, 0.8–1 mm long, narrowed towards base.

Flowering and fruiting: July–September.

Distribution: Temperate Eurasia and N. Africa; introduced and naturalized in USA and Canada; common in Kashmir and Ladakh.

Specimen examined: Ganderbal: 1650 m, veg. fields, *G.H. Dar* 2928.

Notes: Reported commonly from Srinagar, Tangmarg, Ferozepur nullah, Gulmarg, Tsrar-e-Sharief, Pahalgam, Pir Panjal range, Drass, Ladakh, Banihal, Kishtwar, etc. It is close to *A. sieversiana*, but differs in its perennial habit, hoary stem and leaves, short-stalked capitula in dense secund racemes, and acuminate anthers. The whole plant is medicinal, causing headache and giddiness to travellers in areas of its occurrence.

6. **Artemisia amygdalina** Decne. in Jacquem. Voy. Inde Bot. 4: 92. *t.* 100. 1843; Hook.f., Fl. Brit. India 3: 325.1881; Naithani in Hajra & al., Fl. India 12: 13. 1995.

Perennial, large, ± suffruticose, erect herb. Stems many from the base, stout, ± deeply grooved, many-ribbed, glabrous with age. Leaves subsessile, simple, oblong-lanceolate, base cuneate and setose-auricled, apex long-acuminate, margin serrate with incurved gland-tipped teeth, ± glabrous on upper surface and hoary-tomentose beneath. Capitula numerous, subsecund in dense short axillary racemes, ± pendulous, ovoid, 3–4 mm across. Involucral bracts 3 or 4-seriate; outer ± ovate, slightly hairy outside and ciliate along scarious margins, with green midrib; inner bracts obovate-oblong, glabrous, with broadly scarious margins. Florets up to 25, all fertile; marginal ones female, with 2-toothed corolla and exserted style branches; disc-florets bisexual, yellow, with tubular 5-toothed, basally-constricted corolla; anther appendages exserted, obtuse. Achenes terete-cylindrical, *c.* 1 mm long, smooth.

Flowering and fruiting: August–September.

Distribution: Endemic to Pakistan (North West Frontier Province, i.e. Hazara) and Kashmir.

Notes: This species is quite distinct from all other Artemisia species in the Kashmir Himalaya in its simple, serrate leaves; which are hoary-tomentose beneath and glabrous-green on upper surface, looking like those of a willow.

7. **Artemisia vulgaris** L., Sp. Pl.: 848.1753; Hook.f., Fl. Brit. India 3: 325.1881 p.p.; Blatter, Beaut. Fl. Kashm. 1: 167. 1928.

A. superba Pamp. in Nuov. Giorn. Bot. Ital. n. s. 36: 473. 1930.

Perennial, tall, basally suffruticose shrub-like herb. Stems several from an upright rootstock, striate-grooved, leafy, pubescent or subtomentose. Leaves pubescent above, densely ashy-arachnoid hairy beneath; auriculate at base; basal leaves petioled, 1-pinnatisect into elliptic-ovate pinnatifid segments with acute lobes; cauline leaves sessile to subsessile, pinnatisect; the uppermost in floral region entire, acute. Capitula yellowish-brown, numerous, erect or ± nodding, in suberect panicled racemes, 3 x 2 mm. Involucral bracts 4-seriate, arachnoid-hairy, scarious-margined. Florets 10–30, glandular; marginal ones female, fertile, with 2-dentate corolla; disc-florets bisexual, fertile, with 5-toothed corolla. Achenes brownish, c. 1 mm long, finely striate.

Flowering and fruiting: July–October.

Distribution: N. Africa, Europe eastwards to Caucasia, Turkestan, Siberia, Iran, Afghanistan, Pakistan, India; introduced in N. America; Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Nepal to Sikkim, Assam.

Specimens examined: Naranag: 2300 m, banks of nullah, *G.H. Dar* 4277; Najwan: 2500 m, forest floor, *G.H. Dar* 8863.

Notes: It is a very varied and widespread species, usually divided into several infraspecific taxa.

8. **Artemisia incisa** Pamp. in Nuovo Giorn. Bot. Ital. *n. s.* 33: 456. 1926; Naithani in Hajra & al., Fl. India 12: 24. 1995. *A. vulgaris non* L.; *sensu* Hook.f., Fl. Brit. India 3: 325.1881 p.p.; *A. nuristanica* Kitam., Fl. Afghan. 388. f. 94. 1960.

Perennial herb with a horizontal woody rootstock. Stems branched upwards, angular-ridged, sulcate. Leaves shortly petioled to ± sessile, apparently thin, green on upper surface with T-shaped sparse hairs, ± grayish-green arachnoid pubescent beneath, 2-pinnatisect; primary segments 7–9, close to distant, inciso-lobed; secondary segments lanceolate, acute, entire or shallowly incised, mucronate; the uppermost leaves in floral region entire. Capitula yellow, numerous, in elongated panicles or in small racemes, ovate, 2.5–3 mm long and broad. Involucral bracts 3 or 4-seriate, ± glabrous, broadly scarious-margined; outer with green midrib. Florets 16–20, all fertile; marginal ones female, with 2-toothed glandulose corolla and exserted style branches; disc-florets bisexual, with 5-toothed reddish-tinged glandulose corolla. Achenes brown, *c.* 1 mm long.

Flowering and fruiting: July–August.

Distribution: Hindukush-Himalaya from NE. Afghanistan, Pakistan, Kashmir to Himachal Pradesh.

Specimens examined: Ganderbal: 1650 m, along cultivated fields, 22. 8. 1981, *G.H. Dar* 2836; Sind Valley, *C. B. Clarke* 30955A.

9. **Artemisia moorcroftiana** Wall. ex DC., Prodr. 6: 117. 1838; Hook.f., Fl. Brit. India 3: 327.1881.

A. wallichiana Bess. in Nouvo Mem. S. Nat. Moscow 3: 69. 1834; Naithani in Hajra & al., Fl. India 12: 46. 1995.

Perennial herb with a horizontal woody rootstock. Stems several from base, sulcate, ± arachnoid hairy. Leaves long-petioled, green and sparsely hairy on upper surface, grayish arachnoid pubescent beneath, deeply 2-pinnatipartite into oblong primary segments; ultimate segments ± remote, lanceolate, acute; leaves in lower floral region gradually smaller, once divided. Capitula dull purple, sessile, in interrupted, contracted raceme-like panicle with erect to ± appressed spicate branches, hemispherical, 4–4.5 x 4–6 mm. Involucral bracts 3-seriate, purplish; outer obovate, white tomentose; inner subequal, broadly scarious with purplish lines. Florets 15–20, all fertile, purplish; marginal ones female, with linear-tubular, 2-toothed glandulose corolla and long-exserted purple style branches; disc-florets bisexual, clavate-tubular, with 5-toothed basally glandulose and apically ± hairy corolla. Achenes linear-oblong, brown, c. 1.75 mm long.

Flowering and fruiting: July–August.

Distribution: China, Pakistan, India: Himalaya from Kashmir, Himachal Pradesh to Uttar Pradesh, Nepal.

Specimens examined: Sonamarg: 2727–3030 m, *R. R. Stewart* 6321 (PH); Kosturkut, northwest of Vishensar, 3333 m, flowers rusty brown, 6.9.1956, *O. Polunin* 56/711 (BM); Zoji Pass, ± 3333 m, *R. R. Stewart* 22373 (NA); Baltal, fide Hook. f. 1881.

10. **Artemisia roxburghiana** Wall. ex Besser in Bull. Soc. Nat. Moscow 9: 57. 1836; Hook.f., Fl. Brit. India 3: 326.1881; Naithani in Hajra & al., Fl. India 12: 38. 1995.

A. dubia Wall. ex Bess. var. *gracilis* Pamp., 1930.

Perennial herb with a horizontally creeping rootstock. Stems often purplish, branched or simple, sulcate, ascending, leafy, grooved, whitish hairy. Lower leaves tomentose, with winged petioles, 2-pinnatisect into obliquely spreading primary segments, with lanceolate, acute-acuminate secondary segments; middle cauline leaves sessile, basally auricled; the uppermost in floral region linear-lanceolate, entire or 1-pinnatisect. Capitula purplish-black, 3–4 x 2–3 mm, solitary or 2–3 together in dense glomerules, in compound panicled racemes or spikes. Involucral bracts 4-seriate, pubescent or tomentose, purplish tinged, with broad scarious margins. Florets

20–40, all fertile; marginal ones female, with filiform, 2-toothed corolla and long-exserted style branches; disc-florets many, bisexual, with 5-toothed glandulose corolla. Achenes brown, *c.* 1.25 mm long.

Flowering and fruiting: August–October.

Distribution: NE. Afghanistan, Pakistan, S. China, Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh to C. Nepal.

Specimens examined: Najwan: 2500 m, rocky slopes, *G.H. Dar* 6916; Sonamarg, ± 3181 m, 22.8. 1922, *R. R. Stewart* 7379 (K).

Notes: A highly polymorphic species, often divided into several varieties (see Naithani in Hajra & al., Fl. India 12: 38-39. 1995).

11. **Artemisia biennis** Willd., Phytogr. 11, n. 39. 1794; Naithani in Hajra & al.,, Fl. India 12: 14. f. 4. 1995.

A. tournefortiana Reichb. Icon. Bot. Exot. 1: 6, t. 5. 1824; Hook.f., Fl. Brit. India 3: 324. 1881; Naithani in Hajra & al., Fl. India 12: 45. 1995.

Annual erect, usually tall, quite glabrous and non-aromatic herb. Stems mostly unbranched, ± succulent, striate, pale-green. Lower leaves petioled, 2(–3)-pinnatisect; segments distant, oblong, toothed or pinnatifid; cauline leaves subsessile to sessile, gradually smaller, the uppermost in floral region pinnatifid or entire. Capitula greenish-yellow, numerous, erect, in very dense, axillary, strict, compound panicles, resembling the inflorescence of an amaranth. Involucral bracts 3-seriate, glabrous, with narrow scarious margins. Florets numerous, all fertile; marginal ones female, with 2-toothed corolla; disc-florets bisexual, with clavate-tubular, 5-toothed corolla. Achenes oblong-lanceolate, brown, 0.8-1.5 mm long, finely striate.

Flowering and fruiting: July–September.

Distribution: Turkey, USSR, Afghanistan, Pakistan, India, China and N. Armenia; W. and E. Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Nepal to Sikkim.

Specimens examined: Saloora: 1630 m, *G.H. Dar* 3152; Beehama: 1650 m, on mud walls, *G.H. Dar* 3222. Common in NW. Himalaya.

12. **Artemisia laciniata** Willd., Sp. Pl. 3: 1843. 1803; Hook.f., Fl. Brit. India 3: 326.1881.

Perennial, suffruticose, bushy, aromatic herb, with a horizontal-ascending woody rootstock. Stems branched upwards, ribbed, sparsely hairy. Leaves long-petioled, pitted-glandular and ± glabrous, green on upper surface, densely hairy beneath, 2–3-pinnatisect; ultimate segments mostly oblong-linear, *c.* 1 mm wide, entire or serrate; upper leaves shortly petiolate to ± sessile; the uppermost in floral region 1-pinnatisect to entire. Capitula yellow, many to numerous, shortly-recurved pedunculate, broadly campanulate, *c.* 3 x 3–5 mm, nodding, in a lax ± secund racemed panicle. Involucral bracts 3 or 4-seriate, glabrous or nearly so; outer oblong-oval, greenish, with margins narrowly scarious; inner ones narrowly elliptic, with broad scarious margins, obtuse. Florets numerous (45–55), all fertile; marginal ones female, tubular, with glandulose 2-toothed corolla; disc-florets bisexual, with conical, 5-toothed glandulose corolla. Achenes oblong, with fine, longitudinal striations.

Flowering and fruiting: August–September.

Distribution: SE. Europe, C. Asia, Russia, Mongolia, China, Japan, NW. Himalaya from Pakistan to Kashmir. Reported from Sonamarg (*R. R. Stewart* 9912a).

13. **Artemisia gmelinii** Web. ex Stechm., Dissert. de Artem. 30. 1775; Naithani in Hajra & al., Fl. India 12: 23. 1995.

Artemisia vestita Wall. ex DC., Prodr. 6: 106. 1838; Hook.f., Fl. Brit. India 3: 326.1881; *A. sacrorum* Ledeb., 1815; Hook.f., *l. c.* 326; *A. gmelinii* Web. ex Stechm. var. *vestita* Nakai, Fl. Kor. 2:31. 1911. *Solai, Solai Kath.*

Perennial suffruticose shrub-like, erect, hoary, herb with a woody rootstock. Stems many, paniculately branched, sulcate, grooved, brownish-grey. Leaves glabrous, punctate-glandular above, densely arachnoid hairy beneath; basal leaves petioled, 2-pinnatisect into narrowly- oblong, less than 1 mm wide serrate or entire acute ultimate segments; middle and upper cauline leaves subsessile to sessile, 1–2-pinnatisect; the uppermost in floral region 1-pinnatisect or entire. Capitula yellow, hemispheric, 2–2.5 x 2.5–3 mm, nodding on recurved peduncles, in compound hairy racemes. Involucral bracts 4 or 5-seriate, hoary tomentose, scarious-margined. Florets 25–30, all fertile; marginal ones female, narrowly tubular, with 2-toothed glandular corolla; disc-florets bisexual, with conical, 5-toothed glandular corolla. Achenes brown, oblong-ovate, *c.* 1.5 mm long, finely striate.

Flowering and fruiting: August–October.

Distribution: Tibet, Mongolia, N. China, Russia, C. Asia, Himalaya from Pakistan, Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh to C. Nepal.

Specimens examined: Ganderbal: 1800 m, foothills, *G.H. Dar* 3207; Baltal: 3000 m, rocky slopes, *G.H. Dar* 3903.

Notes: An excellent source of honey in Kashmir.

14. **Artemisia santolinifolia** (Turcz. ex Besser) Krasch. in Kyrlov, Fl. Zap. Sib. 11: 2791. 1949. *A. sacrorum* Ledeb. var. *santolinifolia* (Turcz. ex Besser) Pamp. in Nuov., Giorn. Bot. Ital. *n. s.* 34: 693. 1927.

A. sacrorum var. *minor* Ledeb., Fl. Alt. 4: 72. 1833; Naithani in Hajra & al., Fl. India 12: 24. 1995.

Perennial caespitose herb, with dull violet, grooved stem from a woody rootstock. Leaves petiolate, articulate; lower ones triangular-ovate, 3-pinnatisect, with lanceolate-linear, acute ultimate segments; upper leaves 1–2-pinnatisect, ultimately simple and entire. Capitula shortly peduncled, in a strict panicle, ± globose, 3–5 mm across, nodding. Involucral bracts 3-seriate, varying in shape; receptacle convex, glabrous. Florets yellow, numerous, all fertile; marginal ones with tubular, 2-toothed, glandulose corolla; disc-florets tubular, with 5-toothed glandulose corolla. Achenes brown, 1 mm long.

Flowering and fruiting: July–September.

Distribution: Soviet Union, Central Asia, China, Mongolia, Afghanistan, Pakistan and NW. India.

Specimen examined: Sonamarg, 2700 m, roadside slopes, 17.8.1983, *G.H. Dar* 7630.

Notes: Besides Kashmir, it is said to be common on dry sandy-scree slopes in Gilgit, Swat, Baltistan, and Ladakh.

52. **SERIPHIDIUM** (Besser ex Hook.) Fourr. in Ann. Soc. Linn. Lyon II, 17: 89. 1869.

Artemisia sect. *Seriphidium* Besser ex Hook. in Bull. Soc. Nat. Mosc. 1: 222. 1828; Hook.f., Fl. Brit. India 3: 323. 1881; *Artemisia* subgen. *Seriphidium* (Besser) Rouy. Fl. Fr. 8:298.1903.

European and temperate Asian, mostly centered in C. Asia. Now usually included in *Artemisia*. Species *c.* 135, of which 1 occurs in Sind Valley.

Seriphidium brevifolium (Wall. ex DC.) Ling & Y. R. Ling in Acta Phytotax. Sin. 18 (4): 513. 1980. *Artemisia brevifolia* Wall. ex DC., Prodr. 6: 103. 1838; Hook.f., Fl. Brit. India 3: 324. 1881.

A. maritima non. L.: Hook.f., Fl. Brit. India 3: 323. 1881, p.p.; *A. maritima* var. *thomsoniana* C.B. Clarke, Compos. Ind. 160. 1876; *Naithani* in Hajra & al., Fl. India 12: 33. 1995.

Perennial densely arachnoid, grayish-hairy shrublet, with a branched woody rootstock and tufted striate stems. Basal leaves long-petioled, ± orbicular in outline, 3-pinnatisect into narrow-linear, *c.* 0.5 mm wide, divergent ultimate segments; middle and upper cauline leaves sessile or so, with auricled bases, gradually becoming smaller upwards, entire and linear in the inflorescence region. Capitula in axillary spikes, racemes or panicles, subtended by a setaceous leafy bracteole, sessile, erect, oblong-ovate, 3–4.5 x 1.5 mm, distant or close, usually in glomerules of 2–6 towards branch apices. Involucral bracts 5 or 6-seriate, those of outer and inner rows unequal and dissimilar. Florets 4 or 5, tubular, bisexual, all fertile, with 2–2.5 mm long, glandular corolla.

Flowering and fruiting: August–September.

Distribution: NE. Afghanistan, Pakistan, NW. Himalaya from Kashmir to Kumaon.

Specimens examined: Sonamarg, *R. R. Stewart* 3492; Drass to Metsihoi, 3030–3333 m, *R. R. Stewart* 22351 (RAW).

Notes: An important source of santonin in the Kashmir Himalaya.

53. **ACHILLEA** L., Sp. Pl.: 896. 1753. Gen. Pl. ed. 5: 362. 1754.

Distributed in Eurasia and the Mediterranean region; species *c*. 115, of which 1 occurs in Sind Valley.

Achillea millefolium L., Sp. Pl.: 899. 1753; Hook.f., Fl. Brit. India 3: 312. 1881; Naithani in Hajra & al., Fl. India 12: 5. f. 1. 1995.

Perennial, erect, pubescent-glandular herb. Stems suffruticose at base, grooved. Leaves alternate, petiolate, oblong-lanceolate, 2–3-pinnatisect; primary segments linear to linear-lanceolate, acute-acuminate; ultimate segments linear-filiform, mucronate. Capitula in compound corymbs, 5-6 mm across, white, radiate; involucral bracts few-seriate, erect, outer ones shorter, with brown scarious margins. Ray-florets female, with rounded 3-toothed ligule; disc-florets bisexual, with 5-lobed corolla. Achenes oblong, flattened, shining, epappose.

A highly polymorphic species, usually subdivided into infraspecific taxa. Two subspecies have been recognized in our region:

1a. Plants up to 1 m tall; synflorescence 4–15 cm wide; capitula 50–150 per synflorescence ..... a. ssp. *millefolium*
1b. Plants up to 30 cm tall; synflorescence 2–3 cm wide; capitula 15–30 per synflorescence ..... b. ssp. *chitralensis*

a. **Achillea millefolium** L.subsp. **millefolium**

Flowering and fruiting: July–September.

Distribution: Europe, Asia and N. America, introduced and naturalized in Australia and New Zealand. India: W. Himalaya from Kashmir, Himachal Pradesh to Kumaon (Uttarakhand); Tamil Nadu.

Specimens examined: Nunar: 1750 m, maize fields, *G.H. Dar* 2954; Naranag: 2200 m, maize fields *G.H. Dar* 4266; Pranshur: 3350 m, meadowlands, *G.H. Dar* 8160.

b. **Achillea millefolium** L. subsp. **chitralensis** Hub.-Mor. in Rech. f., Fl. Iran. 158. 64. t. 64. 1986.

Distribution: Described from Chitral, it is endemic to Pakistan and Kashmir.

Specimens examined: Kashmir Province: 1915, *Mrs. Prescott-Decie,* s. n. (BM).

54. **ANTHEMIS** L., Sp. Pl.: 893. 1753; Gen. Pl. ed. 5: 381. 1754.

Distributed in Europe, N. & W. Asia, and N. & E. Africa. Species *c*. 175, of which 1 occurs in Sind Valley.

Anthemis cotula L., Sp. Pl.: 894. 1753; Hook.f., Fl. Brit. India 3: 312. 1881; Naithani in Hajra & al., Fl. India 12: 8. f. 2. 1995.

Annual, erect, glabrous to glabrescent, foetid herb. Stems corymbosely branched. Leaves alternate, subsessile to shortly petioled, deeply 2–3-pinnatisect; ultimate segments very narrowly linear, acute-acuminate, entire or dentate. Capitula solitary, terminal, peduncled, 1.5–3.5 cm across, radiate, rarely discoid. Involucral bracts ovate-oblong, obtuse, margins scarious. Ray-florets sterile, with white, oblong-elliptic, minutely tridentate ligule, rarely absent. Disc-florets bisexual, yellow, tubular, with tube ± dilated below and limb 5-fid. Achenes turbinate, 1–1.5 mm long, ± ribbed, tubercled.

Flowering and fruiting: June–August.

Distribution: C. and SW. Asia, westwards to Algeria, Europe; introduced in N. and S. America, Australia and New Zealand. India: W. Himalaya from Kashmir, Himachal Pradesh to Uttarakhand.

Specimens examined: Beehama: 1650 m, vegetable fields, *G.H. Dar* 2093: Ganderbal: 1650 m, roadsides, *G.H. Dar* 3107; Wayil: 1725 m, wastelands, *G.H. Dar* s. n.

Notes: A highly variable invasive weed in Kashmir valley.

55. **CHRYSANTHEMUM** L. Sp. Pl. 890. 1753; Gen. Pl. ed. 5. 379. 1754.

Eurasian and N. African; species 02 (or *c*. 40, depending on generic circumscription), 1 species occurs in cultivation as a garden ornamental in our area.

Chrysanthemum coronarium L. Sp. Pl. 890. 1753; Naithani in Hajra & al., Fl. India 12: 75. 1995.

Matricaria coronaria (L.) Lam., Encycl. Meth. Bot. 3: 737. 1792.

Herb with much-branched, sulcate, glabrous-glaucous stems. Basal leaves shortly petioled, oblong-obovate, ± entire with 3-fid apex; cauline leaves sessile, 2(–3)-pinnatisect into oblong or lanceolate incised-dentate to entire, usually acute lobes; the upper ones smaller, obovate, 1-pinnatisect. Capitula yellow, solitary terminal, or in clusters of 2–5, borne on peduncles of up to 10 cm long, 1.5–3 cm across. Involucre ± cupular, outer phyllaries ovate-oblong, with brown midrib and scarious margins. Ray-florets 15 or more; ligules broadly oblong, 3-lobed or entire at apex. Disc-florets numerous, glandular or not, with 5-lobed corolla. Achenes dimorphic, often glandular.

Flowering and fruiting: May–September.

Distribution: Europe; widely introduced and cultivated throughout the world, also found as an escape.

Notes: The garden *Chrysanthemum*, which is said to have resulted from the hybridization of *C. indicum* L. and *C. morifolium* Ramat., is a favourite garden ornamental, having long been cultivated in this subcontinent. There are many colour variants which have been recognized as various varieties/forms/cultivars under the Linnaeus' species *C. indicum*. Owing to its different structure of achene, this species, however, is now separated from the true chrysanthemums and placed in the genus *Dendranthema* (DC.) Des Moul. Accordingly, our common garden ornamental locally called as 'Gul-e-Daud' is *Dendranthema indicum* (L.) Des Moul. [*Chrysanthemum indicum* L.; *Matricaria indica* (L.) Desr.; *Pyrethrum indicum* (L.) Cass.;*Tanacetum indicum* (L.) Sch.Bip.]. Similarly, *Chrysanthemum leucanthemum* L., which is characterized by homomorphic, 10-ribbed achenes is now called *Leucanthemum vulgare* (L.) Lam.

56. **LEUCANTHEMUM** Miller, Gard. Dict. Abr. 4th ed. 769. 1754.

Chrysanthemum sect. *Leucanthemum* (Miller) B. Fedtsch., Rast. Turk. 737. 1915; *Pyrethrum* subsect. *Leucanthemum* (Miller) Kitam. in Acta Phyt. et Geobot. 4: 37. 1935 p. p.

Distributed in Europe, especially Central and Southern parts and Siberia, 1 species in N. Africa. Species *c*. 43; represented in the Indian subcontinent by 1 ornamental species, now common as an escape.

Leucanthemum vulgare (L.) Lam., Fl. Fr. 2: 137. 1778; Naithani in Hajra & al., Fl. India 12: 55. 1995. *Chrysanthemum leucanthemum* L., Sp. Pl.: 888. 1753.

Matricaria leucanthemum (L.) Desv., 1792; *Tanacetum leucanthemum* (L.) Sch.Bip., 1844; *Pyrethrum leucanthemum* (L.) Franch., 1885. Ox-eye Daisy.

Perennial erect herb with a ± woody rhizome. Stems simple or several from the rootstock, glabrous or hairy. Leaves petiolate, green-glaucous; basal ones obovate-spathulate, 5–10 cm long, margins crenate, obtusely toothed to deeply pinnatifid, base cuneate; cauline leaves narrowly oblong-obovate, 1.5–5 x 0.5–1.5 cm, crenate to dentate, sessile upwards. Capitula solitary terminal on long, ± naked peduncles, 2–5 cm across, radiate. Involucral bracts ovate-oblong to lanceolate, margins scarious; inner ones with brown scarious tips. Ray-florets female, with white, obtuse or obscurely 3-fid ligule. Disc-florets yellow, bisexual, tubular, with 5-fid ovate-acute lobes. Achenes obconic-cylindrical, 10-ribbed; pappus minute or absent.

Flowering and fruiting: May–September.

Distribution: Native of Europe, distributed eastwards to Russia, C. Asia, China; introduced and naturalized in N. America; cultivated and escaped in Indo-Pakistan subcontinent, including Himalaya.

Notes: Occurs as an invasive weed at tourist resorts, and in botanical gardens and subalpine meadows in the Kashmir Valley.

57. **COTULA** L., Sp. Pl.: 891. 1753; Gen. Pl. ed. 5: 380. 1754.

Distributed in the Southern Hemisphere, mainly S. Africa, Australia and S. America; a few extending to Mexico, NE. Asia, E. Africa, Arabia and N. Africa. Species *c*. 55, of which 1 occurs in Sind Valley.

Cotula anthemoides L., Sp. Pl.: 891. 1753; Hook.f., Fl. Brit. India 3: 316. 1881; Naithani in Hajra & al., Fl. India 12: 52. 1995. *Bobul*.

Annual, small, pale-green, diffuse, glabrous herb. Stems weak, many from the base. Leaves subsessile with semi-amplexicaul petiole, ovate-oblong, pinnatifid to 2-pinnatisect; ultimate segments decurrent and ± curved, narrowly oblong, serrate, ± acute. Capitula yellow, solitary on slender naked filiform peduncles, subglobose, 3–6 mm across, heterogamous, disciform. Involucral bracts narrowly oblong, obtuse, distinctly veined within, ± scarious.

Outer florets female, fertile, with minute corolla. Disc-florets bisexual, fertile, tubular, with campanulate corolla. Achenes ovate, with ± winged margins, outer ones broader and flat.

Flowering and fruiting: May–July.

Distribution: China, India, Pakistan, W. Arabia, S. Africa and Egypt. India: Indo-Gangetic Plain at low altitudes - Punjab, Rajasthan, Madhya Pradesh and Bihar; W. & E. Himalaya from Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh to Sikkim.

Specimen examined: Beehama: 1650 m, wastelands, *G.H. Dar* 1230.

Notes: An important medicinal plant, now endangered in the Kashmir Himalaya.

V.5 **Tribe Senecioneae** Cass., 1819.

Distributed worldwide, but concentrated in C. & S. America. The largest tribe of Asteraceae, it includes 150 genera with *c*. 3000 species; represented in Sind Valley by 8 genera with 14 species.

58. **PARASENECIO** W.W. Smith & Small, Trans. Proc. Bot. Soc. Edinburgh 28: 93. 1923.

Cacalia sensu auct. Plur., non L.; *Koyamacalia* H. Robins & Brettel, Phytologia 27: 270.1973.

Distributed in Eurasia, east to the Aleutian Islands; species *c*. 70, of which 1 occurs in Sind Valley.

Parasenecio levingei (C. B. Clarke) Karthik. & Moorthy, Fl. Pl. India 255. 2009; Qaiser & Abid, Plant Biosystems 144(2): 351, fig. 6. 2010 (isonym); Y. S. Chen, Ann. Bot. Fenn. 48(2): 168. 2011 (isonym). *Senecio levingei* C. B. Clarke, Compos. Ind. 301. 1876; Hook.f., Fl. Brit. India 3: 353.1881.

Cacalia levingei (C. B. Clarke) R. Mathur in R. R. Rao & al., Fl. Ind. Enum. Aster. 20. 1988; R. Mathur in Hajra & al., Fl. India 13: 189. 1995.

Perennial shrubby herb, with smooth, brownish stems. Leaves petiolate, deltoid, palmately 3-lobed; lobes cuneate at base, acuminate at apex and dentate along margins; petioles ± winged. Capitula pedunculate, discoid, bracteate. Involucre cylindrical, with herbaceous, acute bracts. Disc-florets 6–7 mm long. Achenes cylindrical, prominently ribbed; pappus of unequal hairs.

Flowering and fruiting: July–September.

Distribution: Endemic from Swat (Pakistan) eastwards to Kashmir Himalayan mountains.

Specimens examined: Sonamarg, 2727 m, August 25, 1875, *Levinge* 27207 A, type; ibid. 31. 8. 1876, *C. B. Clarke* 30840 A, D; ibid., *R. R. Stewart* 6392, 6715; Baltal, 2424–3030 m, 28. 9. 1848, *T. Thomson* s.n.

59. **SENECIO** L., Sp. Pl.: 866. 1753; Gen. Pl. ed. 5: 373. 1754.

A cosmopolitan genus, chiefly distributed in temperate climates and mountains of the tropics, it is very polymorphic and has been divided into a number of satellite genera during the recent five decades. Still it is one of the largest genera of seed plants, with *c*. 1000–1250 species, the status of some of which is not yet clear. Represented by 2 species in Sind Valley.

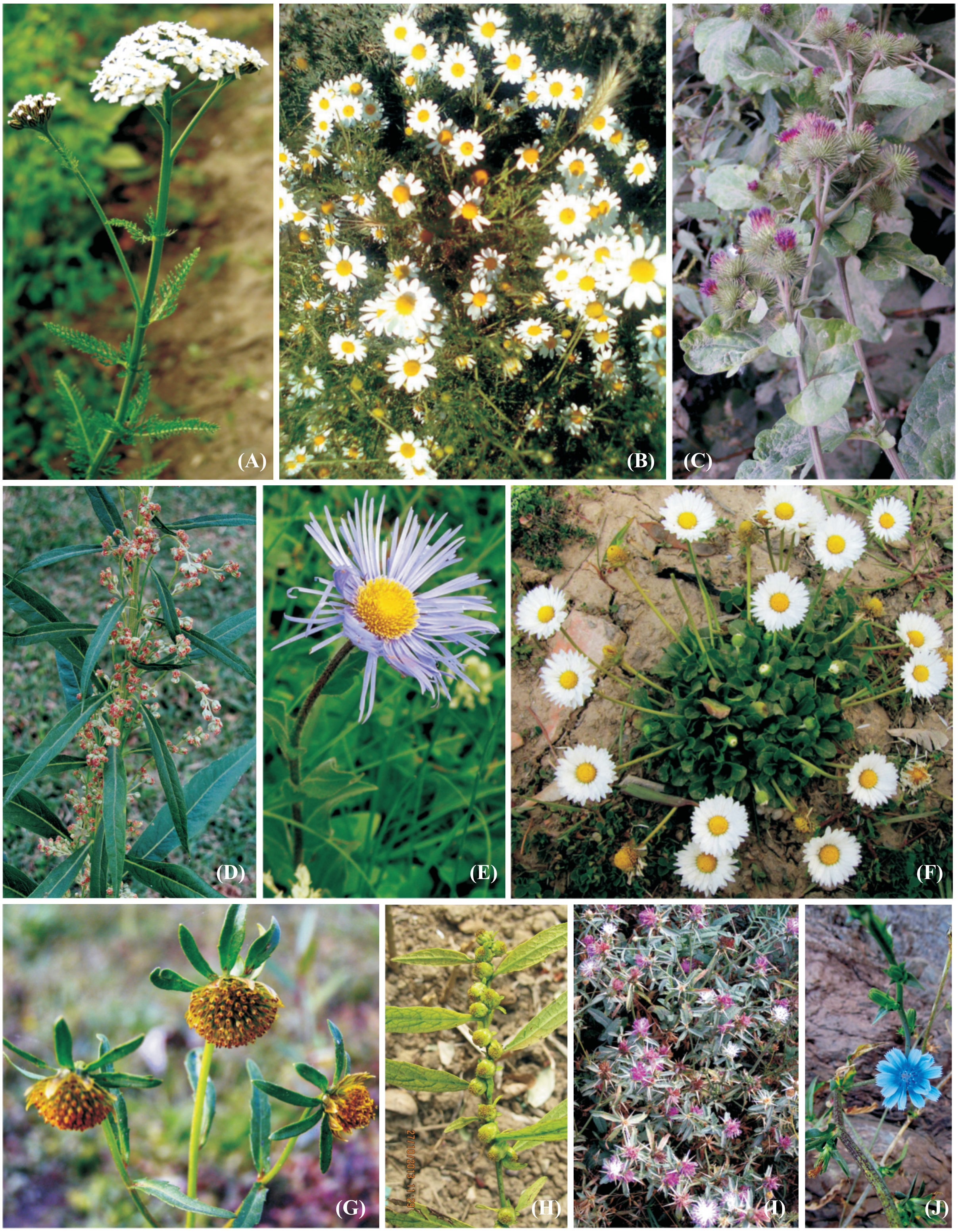

Plate-1 : A. *Achillea millefolium* L.; **B.** *Anthemis cotula* L.; **C.** *Arctium lappa* L.; **D.** *Artemisia amygdalina* Decne.; **E.** *Aster diplostephioides* (DC.) C.B. Clarke; **F.** *Bellis perennis* L.; **G.** *Bidens cernua* L.; **H.** *Carpesium abrotanoides* L.; **I.** *Centaurea iberica* Trev. ex Spreng.; **J.** *Cichorium intybus* L.

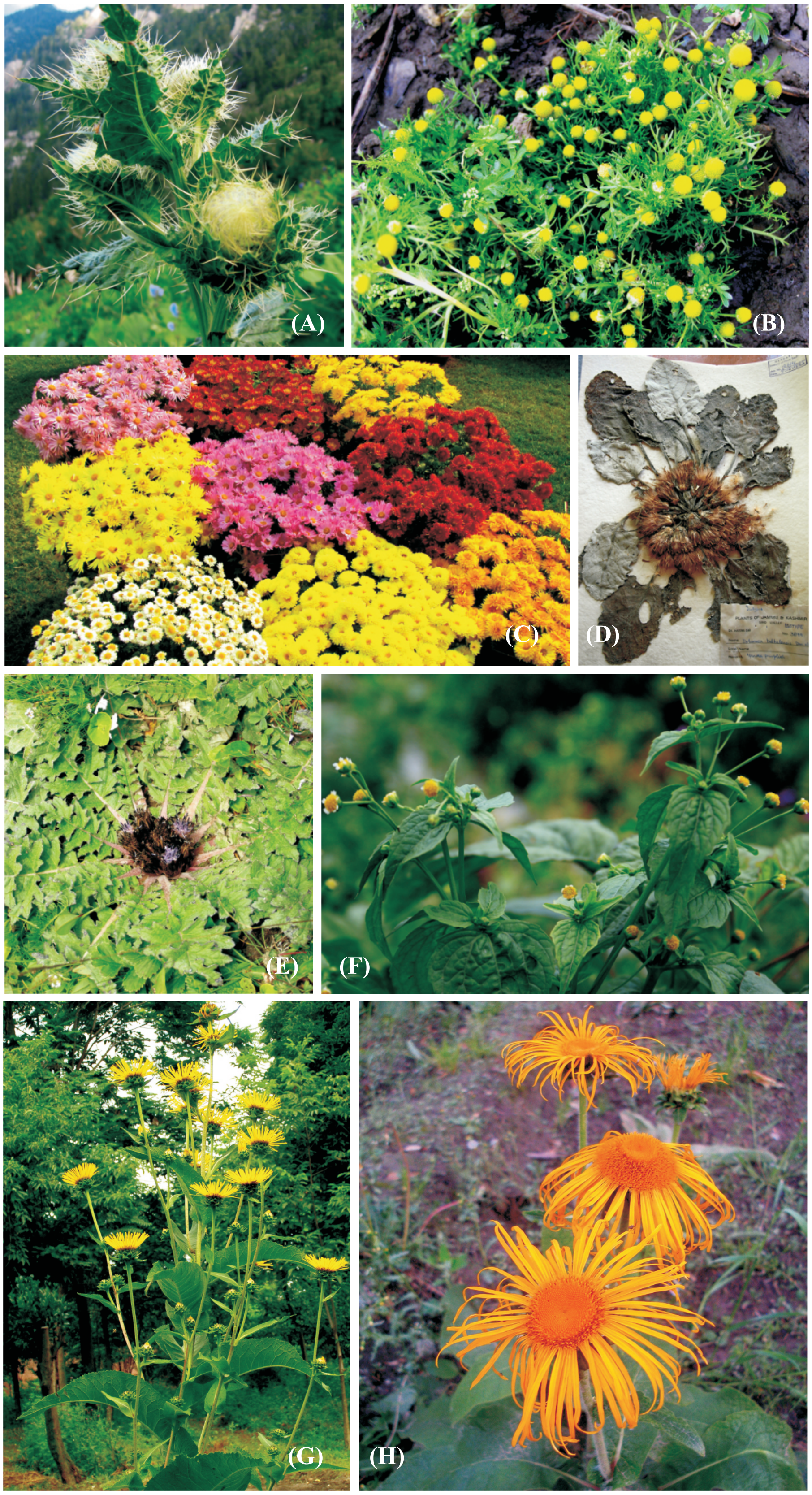

Plate-2 : A. *Cirsium falconeri* (Hook. f.) Petrak; **B.** *Cotula anthemoides* L.; **C.** *Dendranthema indicum* (L.) Des. Moul.; **D.** *Dolomiaea baltalensis* Dar & Naqshi; **E.** *Dolomiaea macrocephala* (Wall.) DC.; **F.** *Galinsoga parviflora* Cav.; **G.** *Inula racemosa* Hook. f.; **H.** *Inula royleana* DC.

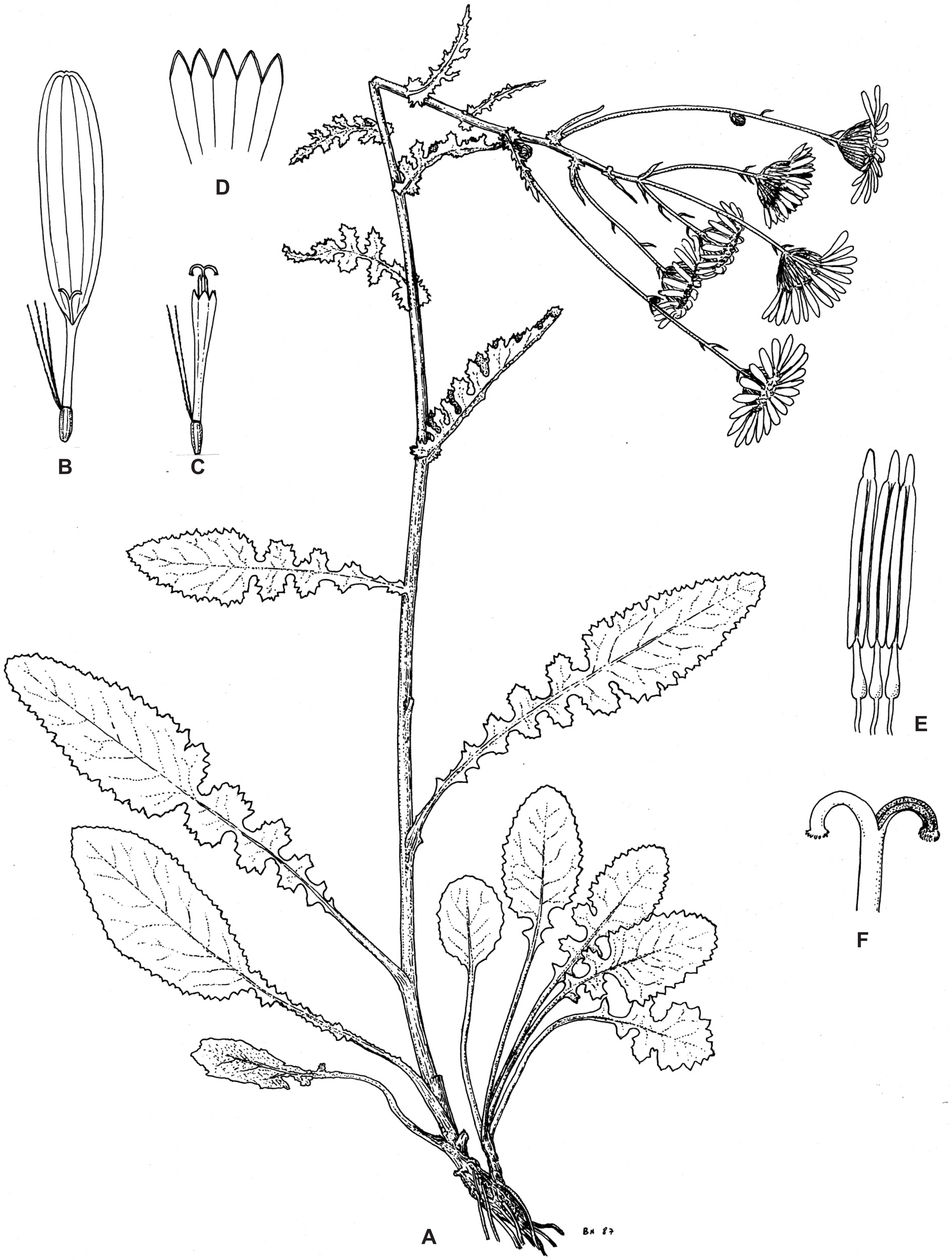

Plate-3 : *Jacobaea tibetica* (Hook. f.) B. Nord. **A.** Habit; **B.** Ray floret; **C.** Disc floret; **D.** Corolla, split opened; **E.** stamens; **F.** Stigma.

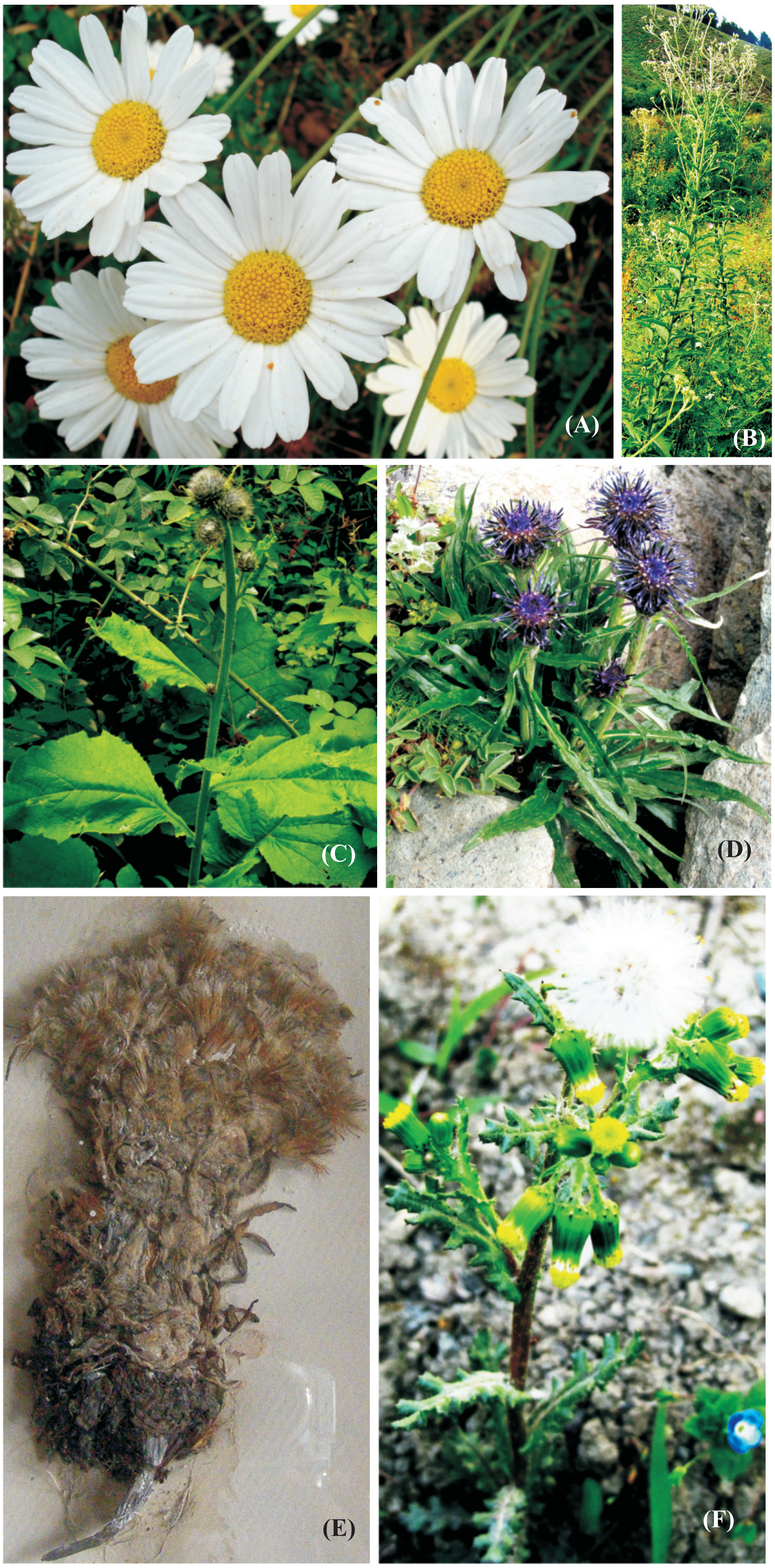

Plate-4 : A. *Leucanthemum vulgare* (L.) Lam.; **B.** *Saussurea candolleana* Wall. ex DC.; **C.** *Saussurea costus* (Falc.) Lipsch.; **D.** *Saussurea roylei* (DC.) Sch.Bip.; **E.** *Saussurea simpsoniana* (Field. & Gard.) Lipsch.; **F.** *Senecio vulgaris* L.

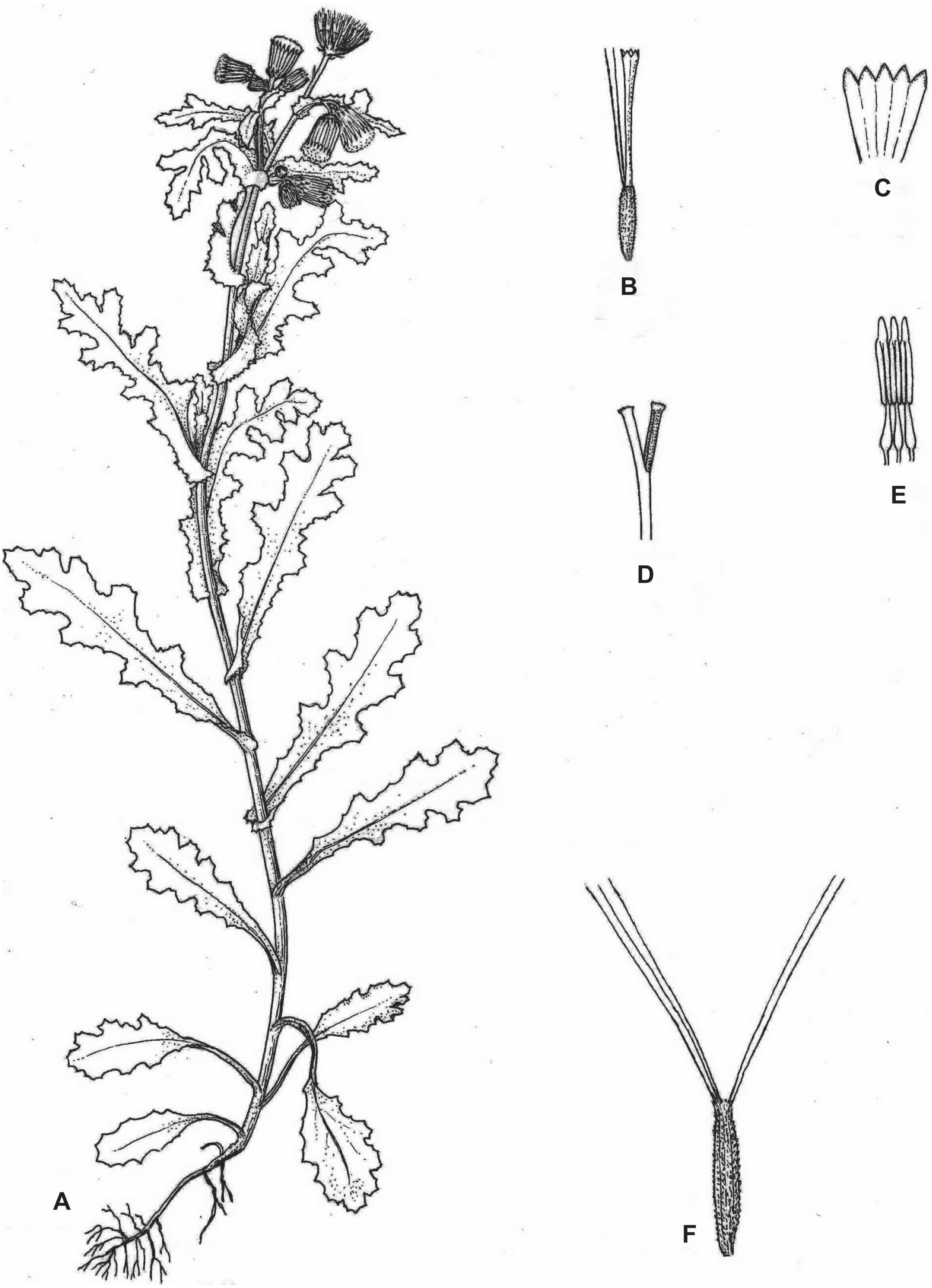

Plate-5 : *Senecio vulgaris* L. **A.** Habit; **B.** Disc floret; **C.** Corolla, split opened; **D.** Stigma; **E.** Stamens; **F.** Achene.

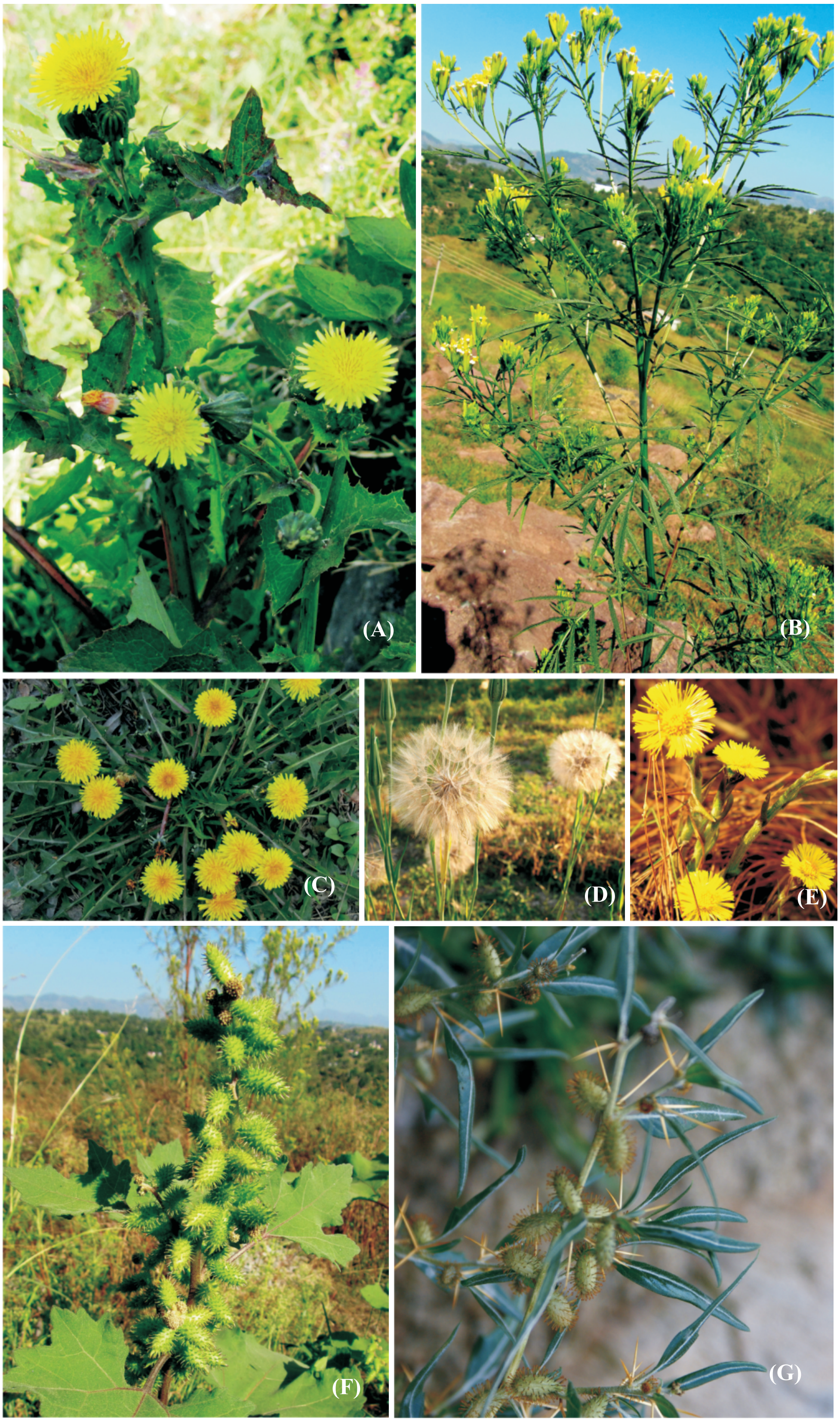

Plate-6 : A. *Sonchus oleraceus* L.; **B.** *Tagetes minuta* L.; **C.** *Taraxacum officinale* W. W. Weber ex F. H. Wigg.; **D.** *Tragopogon kashmirianus* G. Singh; **E.** *Tussilago farfara* L.; **F.** *Xanthium indicum* Koenig; **G.** *Xanthium spinosum* L.

Key to the species

1a. Leaves pinnately lobed with broad ovate and dentate segments; ray-florets usually absent 2. *S. vulgaris*
1b. Leaves pinnatipartite with narrow linear segments; ray-florets 3–7 with short lamina 1. *S. krascheninnikovii*

1. **Senecio krascheninnikovii** Schischkin in Not. Syst. Herb. Inst. Bot. Kom. Acad. Sci. URSS 15: 410. 1953; R. Mathur in Hajra & al., Fl. India 13: 259-60. 1995.

S. pedunculatus Edgew., 1846, *nom. illegit, non* Sch.-Bip, 1844; Hook.f., Fl. Brit. India 3: 342.1881; *S. kashmirianus* Balakr. in J. Bombay Nat. Hist. Soc. 67 : 61. 1970.

Annual, erect, small, glabrous herb; stems slender, divaricately much-branched from the base. Leaves all on the stem, ± dilated at base, pinnatisect; lobes linear, spreading, dentate or entire. Capitula in loose corymbs, pedunculate, bracteolate, many-flowered, yellow, narrowly campanulate, radiate. Involucral bracts linear, acuminate. Ray florets 4–8, oblong, ligules very short; disc-florets numerous. Achenes cylindrical, ± adpressed pubescent; pappus white.

Flowering and fruiting: July–September.

Distribution: Iran, Tianshan, China, W. Tibet, N. E. Afghanistan, Pakistan, Western Himalaya from Kashmir to Garhwal.

Specimens examined: Hang: 2500 m, banks of Sind river, *G.H. Dar* 8539; Sonamarg: 2700 m, roadside slopes, *G.H. Dar* 8602.

Notes: Some authors recognize two varieties: var. *krascheninnikovii* (with ray-florets yellow) and var. *alba* (with ray-florets white).

2. **Senecio vulgaris** L., Sp. Pl.: 867. 1753; R. Mathur in Hajra & al., Fl. India 13: 280. f. 87. 1995.

Annual herb; stems erect or decumbent, little branched, often rooting at lower nodes. Leaves alternate, oblanceolate or oblong, coarsely pinnatifid, lower leaves narrowed to a petiole, upper leaves sessile with auricled base. Capitula in lax corymbs, yellow, ± 1 cm long, 3–5 mm across, pedunculate, bracteolate, discoid. Involucral bracts uniserate, with a few outer smaller ones, linear, with black tips, subequal, narrowly scarious-margined. Ray-florets absent; disc-florets with 5-lobed corolla. Achenes fusiform, ribbed, hairy; pappus white, pale yellow or brown.

Flowering and fruiting: October–June.

Distribution: Europe, N. Africa, Asia, Iran, Afghanistan; introduced in temperate regions of the world. In India, it has been reported from Jammu & Kashmir, Assam and Tamil Nadu.

Specimens examined: Saloora: 1653 m, weed of cultivation, *G.H. Dar* 453; Ganderbal: 1650 m, veg. fields, *G.H. Dar* 3000; Nunar: 1700 m, *G.H. Dar* 4644.

60. **JACOBAEA** Mill., Gard. Dict. Abr. ed. 4: 667. 1754.

Distributed in Eurasia. The genus, although old, is recently separated from *Senecio* (Nordenstam 2006, Pelser & al., 2006, Nordenstam 2007, Nordenstam & al., 2009). Species *c*. 40, of which 3 species are recorded from Sind Valley.

Key to the species

1a. Leaves glabrous or sparsely arachnoid-tomentose beneath 2
1b. Leaves white cottony-tomentose beneath 3. *J. tibetica*

2a. Capitula cylindrical, c. 8 mm across; involucral bracts 5–7, obtuse; ray-florets 2–4; disc-florets 5–8; leaves petiolate, not clasping; leaf lobes unequally serrate 2. *J. graciliflora*
2b. Capitula campanulate, c. 12 mm across; involucral bracts 10–12, acute; ray-florets 8–13; disc-florets numerous; leaves sessile, cauline ones amplexicaul with auricled base; leaf lobes dentate 1. *J. analoga*

1. **Jacobaea analoga** (DC.) Veldk. in Comp. Newsl. 44:3. 2006. *Senecio analogus* DC., Prodr. 6: 366. 1838.

Senecio laetus Edgew. in Trans. Linn. Soc. Bot. 20: 74. 1846; R. Mathur in Hajra & al., Fl. India 13: 263. 1995; *S. chrysanthemoides* DC. Prodr. 6: 365. 1838; C.B. Clarke, Compos. Ind.: 189. 1876; Hook.f., Fl. Brit.

India 3: 339. 1881; *S. sisymbriiformis* DC., *l.c.* 366; *S. spectabilis* Wall. ex DC., *l.c.* 366; *S. chrysanthemoides* var. *spectabilis* (Wall. ex DC.) Hook.f., Fl. Brit.India3:339.1881.

Perennial, erect, rhizomatous herb. Lower leaves lyrate-pinnatifid with an auricled petiole and larger, gashed, terminal lobe; upper leaves sessile, small, amplexicaul, pinnatifid, the lobes often very large, toothed. Capitula in dense corymbs, yellow, *c.* 12 mm across, pedunculate, bracteolate, radiate. Involucral bracts 10–12, oblong, acute, with scarious margins. Ray-florets 8–13, oblong, 4-veined, ligules, 3-toothed at apex; disc-florets numerous. Achenes brown, cylindrical, prominently ribbed.

Flowering and fruiting: July–September.

Distribution: Afghanistan, S. China, Pakistan, temperate and alpine Himalaya from Kashmir to Nepal, Sikkim, Assam, to Bhutan.

Specimens examined: Beehama: 1650 m, borders of paddy fields, *G.H. Dar* 2737; Ganderbal: 1650 m, borders of paddy fields, *G.H. Dar* 2741; Baltal: 3000 m, sandy slopes, *G.H. Dar* 3864; Naranag: 2200 m, banks of nullah, *G.H. Dar* 4269; Wayil: 1725 m, *G.H. Dar* 6689; Sarbal: 3000 m, meadowlands, *G.H. Dar* 7684; Sonamarg: 2800 m, mountain slopes, *G.H. Dar* 7751.

Notes: A variable species, usually divided into two varieties: var. *laetus* and var. *analogus* (Hook.f.) R. Mathur (*S. chrysanthemoides* var. *analogus* Hook.f.; *S. analogus* DC.).

2. **Jacobaea graciliflora** (DC.) Sennikov Komarovia 6(2): 98. 2010 [2008 publ. 19 May 2010]; *Senecio graciliflorus* DC. Prodr. 6: 365. 1838; C.B. Clarke, Compos. Ind.: 188. 1876; Hook.f., Fl. Brit. India 3: 338. 1881; R. Mathur in Hajra & al., Fl. India 13: 252. f. 76. 1995.

S. pleopterus Diels, 1912; *S. graciliflorus* DC. var. *pleopterus* (Diels) Hand.-Mazz, 1937.

Biennial to perennial, rhizomatous, glabrous herb, with shining grooved stems. Leaves petiolate, membranous, pinnately divided into ovate- or oblong-lanceolate, acute, coarsely-toothed segments; petiole dilated basally. Capitula yellow, numerous, often drooping, narrowly cylindric, 5–8-flowered, in small clusters forming corymbs. Involucral bracts linear, obtuse. Ray-florets 2–5, inconspicuous, ligules deeply 3-toothed; disc-florets 7-9 mm long. Achenes 2.5–3mm long, ribbed, grey; pappus white.

Flowering and fruiting: August–October.

Distribution: Temperate Himalaya from Kashmir, through Nepal, Sikkim to Bhutan, S. E. Tibet.

Specimens examined: Naranag: 2300 m, forest floor, *G.H. Dar* 4208; Ibid. 2500 m, banks of nullah, *G.H. Dar* 8861.

3. **Jacobaea tibetica** (Hook.f.) B. Nord. in Comp. Newsl. 44: 13. 2006**.** *Senecio tibeticus* Hook.f., Fl. Brit. India 3: 340. 1881; R. Mathur in Hajra & al., Fl. India 13: 279. 1995.

Perennial, erect, rhizomatous herb, with grey stem(s). Radical leaves long-petioled, lanceolate, pinnatifid into a terminal dentate lobe and short lateral lobes; cauline leaves sessile, ± amplexicaul, oblanceolate, pinnatifid, becoming smaller upwards. Capitula in lax corymbs, bracteolate, radiate; involucral bracts linear-lanceolate, 3-veined, acuminate, broadly scarious-margined. Ray-florets with oblong 3-dentate rays; disc-florets numerous. Achenes 2-2.5 mm long, glabrous, pappus white.

Flowering and fruiting: July–September.

Distribution: N. W. Himalaya from Chitral (Pakistan) eastwards to Kashmir (probably confined to the Kashmir Himalaya).

Specimens examined: Zojibal-Mengandob, *R. R. Stewart* 18260; Nichinai Bar, 3939 m, 3.9.1956, *O. Polunin* 56/653; Salnai, 4090 m, summer 1969, *O. Polunin* 9635.

61. **LIGULARIA** Cass. in Bull. Sci. Soc. Philom. Paris 198. 1816.

Distributed in temperate Eurasia, commonly in China. Species c. 150, out of which 10 species are reported from India and 3 from Sind Valley.

Key to the species

1a.	Capitula in corymbs; ray-florets 1 or 2	3. *L. thomsonii*
1b.	Capitula in racemes; ray-florets several to many	2
2a.	Racemes conical; pappus hairs very short, united at the base	2. *L. jacquemontiana*
2b.	Racemes elongated; pappus hairs unequal, not fused basally	1. *L. fischeri*

1. **Ligularia fischeri** (Ledeb.) Turcz. in Bull. S. Nat. Moscow 20: 11. 1847; R. Mathur in Hajra & al., Fl. India 13: 230. 1995. *Cineraria fischeri* Ledeb., Ind. Sem. H. Dorpat. 17. 1820.

Senecio racemosus Wallich, 1831; *Ligularia racemosa* DC., 1838; *S. sibiricus* auct. non L. f. : C.B. Clarke, Compos. Ind.: 206. 1876; *S. ligularia* Hook.f., Fl. Brit India 3: 349. 1881; *S. ligularia* var. *atkinsonii* Hook.f., 1881; *L. sibirica* var. *racemosa* (DC.) Kitam., 1955; *L. sibirica* var. *longebracteata* Kitam., 1955.

Perennial, erect, stout, shrubby herb, with smooth glaucous stem. Leaves petiolate, cordate, sagittate or ± deltoid or reniform, mucronulately coarse-toothed, prominently veined. Capitula in elongated, leafy racemes, pedunculate, subsecund; involucral bracts unequal, linear-oblong, scarious-margined. Ray-florets yellow, 13–15 mm long; disc-florets 10–12 mm long. Achenes oblong, curved, ribbed; pappus reddish, of unequal hairs.

Flowering and fruiting: July–September.

Distribution: Himalaya (Hazara, Kashmir, eastwards to Bhutan), Myanmar, China, Mongolia, E. Siberia, Sakhalin, Korea, Japan.

Specimen examined: Sonamarg: 2727–3636 m, 9.8.1921, *R. R. Stewart* 6628.

2. **Ligularia jacquemontiana** (Decne.) M. A. Rau, High Alt. Fl. Plants 134. 1975; R. Mathur in Hajra & al., Fl. India 13: 232. f. 71. 1995. *Senecillis jacquemontiana* Decne. in Jacq. Voy. Bot. 90. t. 98. 1844. *Senecio jacquemontianus* (Decne.) Benth. ex Hook.f., Fl. Brit. India 3: 350. 1881.

Perennial, robust, shrubby herb to 1.5 m tall; stems reddish-brown, smooth, grooved. Leaves large, broadly ovate-cordate or subhastate, subobtuse, toothed; petiole of lower leaves stout and winged; of cauline leaves sheathing. Capitula many, yellow, peduncled, in a conical raceme, broadly campanulate; involucral bracts 6-12, oblong, acute, base subconnate. Ray-florets linear-oblong 12-15 mm long; disc-florets 5-lobed. Achenes linear-oblong, black, deeply grooved; pappus hairs very short, united at the base.

Flowering and fruiting: July–August.

Distribution: NW. Himalaya from Hazara (Pakistan) through Kashmir to Himachal Pradesh.

Specimens examined: Najwan: 2800 m, mountain top, *G.H. Dar* 6926; Sonamarg: 2727-3636 m, 9.8.1921, *R. R. Stewart* 6628.

3. **Ligularia thomsonii** (C. B. Clarke) Pojark in Spisok Rast. Herb. Fl. URSS. Bot. Inst. Vsesojuzn. Akad. Nauk 11: 165. 1949; R. Mathur in Hajra & al., Fl. India 13: 236. 1995. *Senecio thomsonii* C.B. Clarke, Compos. Ind.: 205. 1876; Hook.f., Fl. Brit. India 3: 348. 1881.

Perennial, robust, shrubby herb to 1.2 m tall; stems simple, brownish. Leaves large, orbicular, hastate or cordate, toothed; petioles of lower leaves slender, not winged; uppermost leaves linear-lanceolate. Capitula 5–6-flowered, in corymbs, yellow, pedunculate, bracteolate, radiate; involucral bracts 5–6, linear-oblong, free, acute. Ray-florets 1–2, 13–15 mm long; disc-florets 6–8 mm long. Achenes narrow, dimorphic, glabrous, equalling the white scabrid pappus.

Flowering and fruiting: July–September.

Distribution: Hindukush-Himalaya from Karakoram, Pakistan, Kashmir to Nepal.

Specimens examined: Baltal: 3000 m, rocky slopes, *G.H. Dar* 3863; Pranshur: 3700 m, rocky slopes, *G.H. Dar* 8323.

62. **DORONICUM** L., Sp. Pl. 855.1753; Gen. Pl. ed. 5: 377. 1754.

Distributed in Europe, Asia and northern Africa; species 35–40, of which 3 species are reported from India and 1 from Sind Valley.

Doronicum roylei DC., Prodr. 6: 321. 1838; C.B. Clarke, Compos. Ind.: 169. 1876; Hook.f., Fl. Brit. India 3: 332. 1881; R. Mathur in Hajra & al., Fl. India 13: 206. 1995. *D. kamaonense* (DC.) Alvárez Fernandez in Novon 11: 294. 2001; *Fullartonia kamaonensis* DC., Prodr. 5: 281. 1836.

Perennial erect, glandular-hairy herb, with corymbosely branched shining stems. Basal leaves with winged petioles, ovate to linear-lanceolate, cuneate at base, acute at apex, denticulate along margin; cauline leaves sessile, ± amplexicaul. Capitula in corymbs, pedunculate, ebracteolate, 2–3 cm across, radiate, densely glandular-pubescent; involucral bracts lanceolate, acuminate, with brownish veins. Ray-florets yellow, linear-oblong; disc-florets with 5-lobed, papillose corolla. Achenes dimorphic, ribbed; pappus (when present) reddish.

Flowering and fruiting: July–September.

Distribution: Himalaya (from Hazara, Kashmir to Bhutan).

Specimens examined: Sarbal, 2900 m, shady slopes, 17.7.1974, *U. Dar* 851 (KASH); Sonamarg, 2787 m, *H.H. Rich* 1165; ibid, 2803 m, 31.8.1876, *C.B. Clarke* 30842 A-E; ibid: 2727–3030 m, 25.7.1921, *R.R. Stewart* s.n. (KUH).

Notes: Two varieties are usually recognized as follows:

1a.	Pappus present in disc-florets and absent in ray-florets	var. *roylei*
1b.	Pappus entirely absent	var. *epapposa*

Doronicum roylei DC. var. **epapposa** Hook.f., Fl. Brit. India 3: 332. 1881.

Endemic to Jammu & Kashmir.

63. **CREMANTHODIUM** Benth., Hooker's Icon. Pl. 12: 37, *t*. 1141. 1873; emend R. Good, J. Linn. Soc., Bot. 48: 259. 1929.

Distributed in Afghanistan, Tibet, China, India and Nepal. Species *c*. 75, of which 14 species are reported from India and 2 from Sind Valley.

Key to the species

1a.	Radical leaves reniform, 2–2.5 × (1–) 3–6 cm; ray-florets 15–19 mm long	1. *C. decaisnei*
1b.	Radical leaves elliptic, 3–7 × 1.5–3 cm; ray-florets 10–14 mm long	2. *C. elisii*

1. **Cremanthodium decaisnei** C.B. Clarke, Compos. Ind.: 168. 1876; Hook.f., Fl. Brit. India 3: 331. 1881; R. Mathur in Hajra & al., Fl. India 13: 310. f. 97. 1995.

Perennial erect, brownish, small herb, with grooved stems. Radical leaves petiolate, reniform, 2–2.5 × (1–)3–6 cm, mucronately dentate, whitish-brown tomentose beneath; cauline leaves few, much-reduced, sessile with sheathing base, lanceolate. Capitula solitary, nodding, 3–6 cm across, bracteolate; involucral bracts in 2 rows, overlapping, pubescent. Ray-florets yellow, linear-oblong, 15–19 mm long; disc-florets 7–8 mm long. Achenes dimorphic, those of ray-florets *c*. half the length of disc-florets; pappus white, scabrid.

Flowering and fruiting: July–September.

Distribution: Himalaya (from Gilgit, Kashmir, eastwards to Bhutan), Tibet, China.

Specimens examined: Sonamarg, *R.R. Stewart* 6570, 7258, 9831; Zoji La, 4090 m, *Ludlow & Sherriff* 8027; Nichinai Bar, 4056 m, *P.M. Pinfold* 380.

Notes: R. Good (1929) recognized forma *clarkei*, having ray-florets with obsolete tube, from the E. Himalaya (Sikkim).

2. **Cremanthodium ellisii** (Hook.f.) Kitam. in Hara & al., Enum. Fl. Pl. Nepal 3: 22. 1982; R. Mathur in Hajra & al., Fl. India 13: 311. 1995. *Werneria elisii* Hook.f., Fl. Brit. India 3: 357. 1881.

Senecio arnicoides var. *frigida* Hook.f., Fl. Brit. India 3: 351. 1881; *Cremanthodium plantagineum* Maxim. in Bull. Acad. Sci. St.-Pet. 27: 481. 1881; *C. plantagineum* f. *elisii* (Hook. f.) R. Good in J. Linn. Soc. Bot. 48: 293. 1929; *Senecio kunawarensis* Nair, Fl. Bashahr Himalaya 164. 1977.

Perennial dwarf herb, slender to robust, with gray lanate pubescence. Radical leaves petiolate, elliptic, subentire to dentate, 3–7 × 1.5–3 cm, glabrous; cauline leaves sessile, amplexicaul, linear, smaller, densely tomentose. Capitula solitary (to several), nodding, 4–7 cm across, radiate; involucral bracts densely woolly with black glandular hairs, or ± glabrous. Ray-florets yellow, 10–14 mm long; disc-florets 6–7 mm long. Achenes dimorphic, elliptic-oblong; pappus white, scabrid.

Flowering and fruiting: July–September.

Distribution: Himalaya from Ladakh (Jammu & Kashmir), eastwards through Nepal to Bhutan; China.

Specimens examined: Haramukh: 3939 m, 29.7.1940, *F. Ludlow & G. Sherriff* 7859; Zojpal: 4090 m, 4.9.1924, *B. O. Coventry* 943.

64. **PETASITES** Miller, Gard. Dict. abr. ed.: 4. 1754.

Distributed in N. temperate regions of Eurasia and N. America; species *c*. 20, of which 1 occurs in the Kashmir Himalaya.

Petasites tricholobus Franch. in Nouv. Arch. Mus. Hist. Nat., ser. 2, 6: 52. 1883; Pl. David. 1: 172. 1884; R. Mathur in Hajra & al., Fl. India 13: 320. 1995. *Petasites himalaicus* Kitam. in Acta Phyt. Geobot. 15: 108. 1954.

Perennial, dioecious, rhizomatous herb, with bracteate tomentose scapes. Leaves petiolate, reniform, cordate, thin, toothed, pubescent on both surfaces. Capitula in corymbs, pedunculate, bracteate, heterogamous; receptacle pitted. Involucral bracts in 2 rows, subequal, glabrous, veined, with scarious margins. Male florets a few, with 5-lobed corolla; female florets thin, disciform, with 2-lobed corolla. Achenes cylindrical, 2.5–3 mm long; pappus soft, faintly scabrid.

Flowering and fruiting: June–August.

Distribution: Vietnam, Taiwan, China, Tibet, Himalaya [from Swat (Pakistan), eastwards through Nepal to Bhutan].

Specimen examined: Near Baltal, 3030–3333 m, 28.6.1892, *J.F. Duthei* 11594.

65. **TUSSILAGO** L., Sp. Pl.: 865. 1753; Gen. Pl. ed. 5: 372. 1754.

A monotypic genus, distributed in Europe, N. Africa, N., W. & C. Asia, Turkey, Iran, Afghanistan, Siberia, and Himalaya to China, introduced in N. America.

Tussilago farfara L., Sp. Pl.: 865. 1753; Hook.f., Fl. Brit. India 3: 330.1881; R. Mathur in Hajra & al., Fl. India 13: 321. f. 98. 1995.

Perennial, woolly, scapigerous herb, with stoloniferous rootstocks; stem(s) covered with purplish scales. Leaves all radical, long-petioled, coming after the flowers, orbicular-cordate, toothed. Capitula solitary, yellow, 2–3 cm across, drooping in bud, radiate. Involucral bracts equal, linear-lanceolate, white tomentose basally. Ray-florets in 1 row, linear; disc-florets with tube almost as long as the limb. Achenes brown, oblong, *c*. 1 mm long, feebly ribbed; pappus soft, white.

Flowering and fruiting: March–June.

Distribution: An Eurosiberian element, with distribution same as that for the genus.

Specimens examined: Badrakund, Ganderbal: 1700 m, stream banks, *G.H. Dar* 320; Baltal, 21.6.1901, *Inayat* 25670; Gund: 2545 m, early April, 1925, *R. Meinertzhagen* s. n. (BM).

V.6 **Tribe Tageteae** Cass., 1819.

Distributed in the New World, mostly in the xeric highlands of Mexico. A small tribe, comprising 32 genera with *c*. 270 species. Represented in India by 2 genera with 4 species, of which only one species has naturalized in Kashmir.

66. **TAGETES** L., Sp. Pl.: 887. 1753.

Native to America, mostly cultivated as ornamental plants elsewhere, commonly known as marigolds. Species 40–50, of which 1 species is naturalized in our area.

Tagetes minuta L. Sp. Pl. 887. 1753; R.R. Rao in Hajra & al., Fl. India 13: 327. f. 100. 1995.

Annual scented herb. Leaves pinnate, with linear-lanceolate leaflets which are distinctly gland-dotted and sharply serrate. Capitula numerous, cymose, 3–4 mm across; involucre only a little shorter than florets. Florets yellow; ray florets a few, with 2-toothed ligules; disc florets tubular, 5-toothed. Achenes angular 5–7 mm long, pubescent with shiny hairs; pappus scales 5, unequal, one much exceeding the others.

Distribution: Native of S. America; naturalized in Nepal and India (Himalayan and sub-Himalayan States).

Notes: Two other species commonly grown in gardens are *T. erecta* L. ('French marigold'- heads 5–8 cm across; ray-florets usually yellow; native of Mexico), and *T. patula* L. ('African marigold'- heads 2.5–4 cm across; ray-florets yellow, mostly marked with red; native of Mexico). Another species, *T. tenuifolia* Cav. (heads c. 3 cm across; ray-florets 5; native of America) may also be grown.

V.7 **Tribe Heliantheae** Cass., 1819.

Distributed in the tropical, subtropical and temperate regions of the world, mainly pantropical. The tribe comprises *c*. 113 genera with *c*. 1500 species; represented in Sind Valley by 2 cultivated species in *Helianthus*.

67. **HELIANTHUS** L., Sp. Pl.: 904. 1753.

Distributed in central North America, the genus comprises *c*. 50 species.

Helianthus is characterized by capitula large, on thick solid peduncles, heterogamous, radiate; involucre broadly campanulate, bracts 2–5-seriate; ray-florets 1-seriate, yellow; disc-florets tubular-infundibuliform, 5-lobed, yellow; receptacle convex, paleae concave, rigid, acuminate, embracing achenes, persistent; achenes oblong, subtetragonous; pappus deciduous.

Two species are cultivated in Kashmir:

Helianthus annuus L., Sp. Pl.: 904. 1753; H.J. Chowdhery in Hajra & al., Fl. India 12: 431. 1995.

A native of North America, the Sunflower is cultivated for its seeds (achenes), which yield valuable edible oil, also commonly grown as an ornamental.

Helianthus tuberosus L., Sp. Pl.: 905. 1753; Chowdhery in Hajra & al., Fl. India 12: 431. 1995.

The Jerusalem Artichoke is sometimes cultivated for its edible tubers. In Kashmir it is commonly called as *'Farash Gogij'*. It is also known in cultivation from Uttarakhand, Assam and W. India.

V.8 **Tribe Millerieae** Lindl., 1829.

Distributed mainly in the New World, this tribe comprises 34 genera with *c*. 400 species; represented in Sind Valley by 2 genera with 2 species.

68. **GALINSOGA** Ruiz & Pavon, Prodr. Fl. Peruv.: 110, *t*. 24. 1794.

Distributed all over the New World; species *c*. 16, of which 1 occurs in Sind Valley.

Galinsoga parviflora Cav., Icon. Descr. Pl. 3: 41, t. 281. 1795; Hook.f., Fl. Brit. India 3: 311. 1881; Chowdhery in Hajra & al., Fl. India 12: 388. f. 105. 1995.

Annual, weak, flaccid, erect. Leaves opposite, petioled, ovate, acute-acuminate at apex, rounded-cuneate at base, margin undulate-serrate to entire, membranous, sparsely pilose when young. Capitula 4–6 mm across, on axillary and terminal peduncles; involucral bracts 5–10, 2-whorled, scarious-margined. Ray-florets 4 or 5, with 3-lobed, white corolla. Disc-florets many, with tubular, yellow corolla 5-lobed. Achenes obconic, angled, rough-pubescent, black; pappus scales 8–12, elliptic-oblong.

Flowering and fruiting: May–October.

Distribution: Native of tropical America, now a cosmopolitan weed; almost throughout India from plains to 2000 m.

Specimen examined: Beehama, 1650 m, vegetable fields, *G.H. Dar* 1515.

69. **SIEGESBECKIA** L., Sp. Pl.: 900. 1753; Gen. Pl. ed. 5: 383. 1754.

Distributed in warmer regions of the Old and the New World; species 9, of which 1 occurs in Sind Valley.

Siegesbeckia orientalis L., Sp. Pl.: 900. 1753; Hook.f., Fl. Brit. India 3: 304. 1881; Chowdhery in Hajra & al., Fl. India 12: 407. f. 115. 1995.

Annual, erect. Stems branched, with spreading, opposite, lower branches, tinged purple. Leaves opposite, long-petioled, triangular-ovate, apex acute-apiculate, margins toothed or crenate, base truncate or cuneate, pubescent on both surfaces. Capitula in leafy corymbose panicles, yellow, 4–8 mm across; involucral bracts leafy, conspicuously glandular, in 2 rows of 5 each, the outer clavate and spreading, the inner navicular. Ray-florets 5, female; ligule 2–3-lobed, reddish beneath. Disc-florets *c*. 12, bisexual; corolla tubular, 5-lobed. Achenes curved and angled.

Flowering and fruiting: July–September.

Distribution: Cosmopolitan, in all warmer countries in both Old and New World; throughout India.

Specimens examined: Beehama, 1650 m, moist roadsides, *G.H. Dar* 2571; Shallabugh, 1600 m, under willow plantations, *G.H. Dar* 2600; Naranag, 2300 m, forest floor, *G.H. Dar* 4124.

V. 9 **Tribe Coreopsideae** Lindl., 1829.

Cosmopolitan in its distribution, this tribe comprises 30 genera with *c*. 550 species; represented in Sind Valley by 2 genera with 6 species.

70. **BIDENS** L., Sp. Pl.: 831. 1753; Gen. Pl. ed. 5: 362. 1754.

Cosmopolitan, chiefly American; species *c*. 280, of which 4 species occur in Sind Valley.

Key to the species

1a.	Leaves simple, not lobed	2
1b.	Leaves pinnately lobed or dissected	3
2a.	Capitula 1–3 cm across; outer involucral bracts 2–4 cm long;achenes with 2–4 equal, retrorsely barbed bristles	1. *B. cernua*
2b.	Capitula less than 1 cm across; outer involucral bracts less than 1cm long; achenes with 4 unequal, smooth spines	2. *B. tetraspinosa*
3a.	Outer involucral bracts10–30 mm long; capitula solitary, 10–25 mm across	4. *B. tripartita*
3b.	Outer involucral bracts 5–8 mm long; capitula usually numerous, 4–12 mm across	3. *B. pilosa*

1. **Bidens cernua** L., Sp. Pl.: 832. 1753; Hook.f., Fl. Brit. India 3: 309. 1881; Chowdhery in Hajra & al., Fl. India 12: 369. f. 96. 1995.

Annual, erect, glabrous. Stems simple or branched, rooting from basal nodes. Leaves opposite, sessile, linear to lanceolate, margin serrate, base subcordate, sometimes auricled. Capitula solitary, terminal, (1–)1.5–3 cm across, drooping, yellow. Involucral bracts in 2 rows; outer leafy, narrowly-lanceolate; inner ovate, membranous. Ray-florets absent. Disc-florets bisexual; corolla tubular, 5-toothed or lobed. Achenes 4-angled, topped with 2–4 retrorsely-barbed bristles.

Flowering and fruiting: July–September.

Distribution: N. Asia, north and middle Europe, N. America; Himalaya from Kashmir to W. Nepal.

Specimens examined: Darend, borders of paddy fields, 1625 m, *G.H. Dar* 2517; Doderhama: 1650 m, marshes, *G.H. Dar* 2949; Kujar, marsh, 1625 m, *G.H. Dar* 3033; Anchar Lake, floating Islands, 1600 m, *G.H. Dar* 3265.

2. **Bidens tetraspinosa** Kak & Javeid, J. Bombay Nat. Hist. Soc. 79: 175. 1982; Chowdhery in Hajra & al., Fl. India 12: 375. 1995.

Annual, diffuse-ascending. Stems branched, sulcate, rooting from lower nodes. Leaves opposite, simple, sessile to subsessile; lower usually lanceolate, entire or remotely toothed; upper ones linear, acute, irregularly serrate. Receptacle flat or dome-shaped, *c*. 4 mm across. Involucral bracts in 2 rows; outer 2–6, lanceolate, yellow with brown streaks; inner linear-lanceolate. Capitula discoid; florets with tubular-campanulate, 5-lobed corolla. Achenes cuneate, 4-angled, topped with 4 unequal smooth spines.

Flowering and fruiting: July–September.

Distribution: Described from Srinagar, Kashmir.

Specimen examined: Anchar Lake, on floating islands, 1600 m, October 1974, A.M. Kak 627 (KASH, isotype).

3. **Bidens pilosa** L., Sp. Pl.: 832. 1753; Chowdhery in Hajra & al., Fl. India 12: 372. 1995.

B. chinensis auct. non Willd. : Hook.f., Fl. Brit. India 3: 309. 1881.

Annual, erect, glabrous or pubescent. Leaves opposite, long-petioled, 3–5-partite, imparipinnate; terminal leaflet ovate-lanceolate, attenuate at base to a longer petiole, gradually acuminate at apex, serrate; lateral leaflets ovate, ± abruptly attenuate to a short petiole, acute or shortly acuminate at apex. Capitula usually numerous, in loose corymbose panicles, 4–12 mm across. Involucral bracts in 2 rows; outer green, ± spathulate, obtuse; inner bracts oblong-lanceolate, acute, with scarious margins. Ray-florets 4–7, with 5-toothed, white corolla, sometimes absent. Disc-florets many, with tubular, 5-toothed, yellow corolla. Achenes fusiform, 4-gonous, papillose, black, topped with 2–4 pale retrorsely barbed bristles.

Flowering and fruiting: August–October.

Distribution: C. & S. America, Africa, SE. Asia, Australia, New Zealand, Sri Lanka, almost throughout India.

Specimens examined: Sarich, 1700 m, maize fields, *G.H. Dar* 2929; Hari Ganiwan, 2000 m, in maize crop, *G.H. Dar* 8475.

Notes: Two varieties are generally recognized in this species, viz. var. *pilosa* (capitula radiate, with 4–7 rays), and var. *minor* (Blume) Sherff (capitula discoid, i.e., with no rays).

4. **Bidens tripartita** L., Sp. Pl.: 831. 1753; Hook.f., Fl. Brit. India 3: 309. 1881; Chowdhery in Hajra & al., Fl. India 12: 375. f. 100. 1995.

Annual, erect, glabrous to hirsute herb. Leaves opposite, 3-lobed, 3-partite or pinnatifid; segments lanceolate, toothed, acuminate. Capitula solitary, terminal or axillary, erect, discoid, (1–)1.5–2.5 cm across mm across, yellow. Involucral bracts in 2 rows; outer leafy, lanceolate-spathulate, spreading; inner bracts ovate or elliptic-lanceolate, with scarious margins. Ray-florets absent. Disc-florets many; corolla tubular-campanulate, 5-toothed. Achenes cuneate, with ± retrorsely-hispid margins, topped with 2–3 short awns.

Flowering and fruiting: August–October.

Distribution: N. Asia, Japan and westward to N. Africa, W. Europe and N. America; Himalaya from Kashmir to E. Nepal.

Specimen examined: Kulan, Gund: 2100 m, roadsides, *G.H. Dar* 8578.

Notes: Two varieties recognized in this species are: var. *tripartita* (plants hirsute, leaves petioled), and var. *repens* (D. Don) Sherff (plants glabrous, leaves subsessile); both are reported from Kashmir.

71. **XANTHIUM** L., Sp. Pl.: 987. 1753; Gen. Pl. ed. 5: 424. 1754.

Distributed in warm temperate regions; species 3, of which 2 occur in Sind Valley.

Key to the species

1a.	Stems armed with 3 (or 4)-fid, strong thorns; leaves narrowly lanceolate, attenuate at ends; fruiting burr blunt or with 2 inconspicuous beaks	2. *X. spinosum*
1b.	Stems not armed with thorns; leaves cordate, orbicular or sub-deltoid; fruiting burr with usually 2, strong porrect beaks	1. *X. indicum*

1. **Xanthium indicum** Koenig in Roxb., Fl. Ind. 3: 601. 1832; Chowdhery in Hajra & al., Fl. India 12: 427. f. 123. 1995. *X. strumarium* L., Sp. Pl.: 987. 1753, p.p.; Hook.f., Fl. Brit. India 3: 303. 1881 (excl. syn. *X. strumarium* Boiss.).

Annual, erect, rough; stems unarmed, usually branched. Leaves alternate, petioled, scabrid, triangular-cordate or orbicular, margin 3–5-lobed; lobes toothed, base cuneate, apex acute to acuminate, hispid. Capitula in terminal and axillary racemes, greenish, unisexual. Male heads hemispherical, 4–8 mm across, many-flowered; involucral bracts few, 1 or 2-seriate; florets crowded, each covered by a translucent scale; corolla tubular, 5-toothed. Female heads ovoid, burr-like, 1–1.5 cm long; outer involucral bracts few; inner many, in one row and fused, covered by hooked bristles and ending in 2 strong divergent beaks; florets 2; corolla absent. Achenes smooth, pointed apically.

Flowering and fruiting: July–September.

Distribution: Eurasia, N. Africa; Sri Lanka, Malay Peninsula, throughout India.

Specimen examined: Ganderbal: 1650 m, wastelands, *G.H. Dar* 3143.

2. **Xanthium spinosum** L., Sp. Pl.: 987. 1753; Razi, Rec. Bot. Surv. Ind. 18: 56. 1959; Dar & al., J. Bombay Nat. Hist. Soc. 87(2): 329. 1990; Chowdhery in Hajra & al., Fl. India 12: 429. 1995.

Annual, erect, robust; stems usually much-branched and tufted, armed with strong, yellow, 3 or 4-fid thorns. Leaves sessile to shortly petiolate, narrowly lanceolate, margin entire to 3–5-fid, apex very acute, base cuneate, tomentose beneath and dark-green on upper surface. Capitula unisexual. Male heads hemispherical, in terminal inflorescence above the female ones; female heads ovoid, solitary in leaf axils, with 2 florets. Fruiting involucre elliptic-oblong, densely covered throughout with hooked bristles and terminating into 2 short straight beaks.

Flowering and fruiting: August–October.

Distribution: Probably native to some part of the New World, now found as a weed almost throughout the warm temperate regions of the world; besides Jammu & Kashmir, reported in India from Rajasthan and W. Bengal.

Specimens examined: Pranshur, on sheep dung in meadowland, 3350 m, *G.H. Dar* 7934–35; Beehama, along foothills, 1750 m, *G.H. Dar* s.n.

Notes: First recorded from Kashmir Valley in 1980s (Dar & al., 1990), this species has since then become an invasive weed in this Himalayan region.

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REFERENCES

ABID, R. AND M. QAISER. 2002a. Genus *Inula* L. (s. str.) (Compositae-Inuleae) in Pakistan and Kashmir. *Candollea* 56(2): 315-325.

ABID, R. AND M. QAISER. 2002b. Cypsela morphology of *Inula* L., (s.str.) and its allied genera (Inuleae-Compositae) from Pakistan and Kashmir. *Pak. J. Bot*., 34(3): 207–223.

ABID, R. AND M. QAISER. 2004. A micromorphological study for the generic delimitation of *Inula* L. (s.str.) and its allied genera (Inuleae-Compositae) from Pakistan and Kashmir. *Pak. J. Bot.* 36(4): 719–24.

ABID, R. AND M. QAISER. 2007. Cypsela morphology of the genus *Anaphalis* DC. (Gnaphalieae-Asteraceae) from Pakistan. *Pak. J. Bot*. 39(6): 1897–1906.

BLATTER, E. 1928–1929. Beautiful Flowers of Kashmir. 2 Vols. John Bale and Staples, London.

BREMER, K. (ed.). 1994. Asteraceae-Cladistics and Classification. Timber Press, Portland, Oregon.

BREMER, K. 2010. Personal reflections on a new Compositae book. In: Bertil Nordenstam (ed.), Compositae Newsletter 48: 1–5. The Swedish Museum of Natural History, Stockholm, Sweden.

CLARKE, C.B. 1876. Compositae Indicae. Thacker, Spink & Co., Calcutta.

COVENTRY, B.O. 1923–1930. Wild Flowers of Kashmir. 3 Series. Raithby Lawrence, London.

DAR, G.H. 1982. Flowering Plant Communities of Ganderbal Block (Sind Valley, Kashmir). *M.Phil. Dissertation* (unpublished), University of Kashmir, Srinagar.

DAR, G.H. AND P. KACHROO. 1983a. Mud wall flora of Ganderbal, Kashmir. *Trop. Plant Sci. Res.* 1: 205–209.

DAR, G.H. AND P. KACHROO. 1983b. Phenology of the vegetation of Ganderbal, Kashmir. *Trop. Plant Sci. Res.* 1: 231–234.

DAR, G. H., P. KACHROO AND U. DHAR. 1983a. Weed flora of cultivated fields of Srinagar, Kashmir Valley*, Trop. Plant Sci. Res.*1: 167–174.

DAR, G. H., P. KACHROO AND U. DHAR. 1983b. Studies on the vegetation of Ganderbal (Kashmir) 1. Community characteristics. *J. Econ. Tax. Bot*. 4: 869–881.

DAR, G. H., VIR JEE, P. KACHROO AND G. M. BUTH. 1984. Ethnobotany of Kashmir 1. Sind Valley. *J. Econ. Tax. Bot*. 5: 668–675.

DAR, G. H. AND A. R. NAQSHI. 1985a. Two new *Epilobium* (Onagraceae) for Kashmir Valley. *Geobios New Reports* 4: 167–168.

DAR, G. H. AND A.R. NAQSHI. 1985b. *Chondrilla setulosa* Clarke, a new record for Kashmir Himalaya. *Geobios New Reports* 4:172.

DAR, G. H. AND A.R. NAQSHI. 1985c. *Bothriospermum tenellum* (Hornem.) Fisch. et Mey. (Boraginaceae) - a new record for Kashmir Himalaya. *J. Bombay Nat. Hist. Society* 82:692–693.

DAR, G. H. AND A.R. NAQSHI. 1987. Two new plant records from Sind Valley, Kashmir. *Geobios New Reports* 6:172–174.

DAR, G. H. AND A. R. NAQSHI. 1990. New plant taxa from the Sind Valley, Kashmir. *J. Bombay Nat. Hist. Soc.* 87 (2): 274–279.

DAR, G. H., A. R. NAQSHI AND S. ARA. 1990. *Xanthium spinosum* L. – A new record for the Indian subcontinent. *J. Bombay Nat. Hist. Soc.* 87 (2): 329–331.

DAR, G. H. AND P. KACHROO. 1992. Floristic diversity in Sind Valley (Kashmir). *J. Econ Tax. Bot*. 16 (3): 647–652.

DAR, G. H., A. R. NAQSHI AND S. ARA. 1995. New records and new taxa of flowering plants from Jammu and Kashmir State, 1970–1992. *J. Oriental Sci. (Special Publication)*: 33–44.

DAR, G. H. AND K. I. CHRISTENSEN. 1999. Habitat diversity and zonality of vegetation in Sind Valley, Kashmir Himalaya. *Nature and Biosphere* 4 (1–2): 49–71.

DAR, G. H., R. C. BHAGAT AND M. A. KHAN. 2002. Biodiversity of the Kashmir Himalaya. Valley Book House, Srinagar, Kashmir.

DHAR, U. AND P. KACHROO. 1983. Alpine Flora of Kashmir Himalaya. Scientific Publishers, Jodhpur.

FUNK, V. A., A. SUSANNA, T.F. STUESSY AND R.J. BAYER (eds.). 2009. Systematics, Evolution and Biogeography of Compositae. IAPT, Vienna.

FUNK, V.A. 2010. Ten things I learned on the way to the Mother Tree (i.e., Mother Ship). In: Bertil Nordenstam (ed.), Compositae Newsletter 48: 6–21. The Swedish Museum of Natural History, Stockholm, Sweden.

GHAFOOR, A. 2002. Asteraceae (I) - Anthemideae. In: S.I. Ali & M. Qaiser (eds.). Flora of Pakistan 207: 1–172. Department of Botany, University of Karachi, Pakistan & Missouri Botanical Garden, USA.

HAJRA, P. K., R.R. RAO, D. K. SINGH AND B.P. UNIYAL (eds.). 1995a. Asteraceae (Anthemideae - Heliantheae). Flora of India 12: 1–454. BSI. Calcutta.

HAJRA, P.K., R.R. RAO, D.K. SINGH AND B.P. UNIYAL (eds.). 1995b. Asteraceae (Inuleae - Vernonieae). Flora of India. 13: 1–411. BSI. Calcutta.

HOOKER, J.D. 1872–1897. The Flora of British India. 7 Vols. L. Reeve & Co., London.

HOOKER, J.D. 1881. Compositae. In: J.D. Hooker (ed.). The Flora of British India 3: 219–419. L. Reeve & Co., London.

KADEREIT, J. W. AND C. JEFFREY (eds.). 2007. The Families and Genera of Vascular Plants, Vol. 8, Flowering Plants, Eudicots, Asterales. Springer, Berlin.

KAUL, M. K. 1986. Weed Flora of Kashmir Valley. Scientific Publishers, Jodhpur.

KHUROO, A. A., IRFAN RASHID, ZAFAR RESHI, G.H. DAR AND B. A. WAFAI. 2007. The alien flora of Kashmir Himalaya. *Biological Invasions* 9: 269–292.

QAISER, M. AND RUBINA ABID. 2003. Asteraceae (II) - Inuleae, Plucheeae & Gnaphalieae. In: S.I. Ali & M. Qaiser (eds.). Flora of Pakistan 210: 1–215. Department of Botany, University of Karachi, Pakistan & Missouri Botanical Garden, USA.

QAISER, M. AND RUBINA ABID. 2011. Asteraceae (III) - Senecioneae & Mutisieae. In: S.I. Ali & M. Qaiser (eds.). Flora of Pakistan 218: 1–84. Centre for Plant Conservation, University of Karachi, Pakistan.

RAO, R.R., H.J. CHOWDHERY, P.K. HAJRA, S. KUMAR, P.C. PANT, B.D. NAITHANI, B.P. UNIYAL, R. MATHUR AND S.K. MAMGAIN. 1988. Florae Indicae Enumeratio Asteraceae. BSI, Dehra Dun.

ROOHI, B. AND M. QAISER. 2010. The genus *Cicerbita W*allr. (Cichorieae-Asteraceae) in Pakistan and Kashmir. *Pak. J. Bot.,* Special Issue (S.I. Ali Festschrift) 42: 35–56.

ROYLE, J.F. 1833–1840. Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains and of the Flora of Cashmere. 2 Vols. W.N. Allen, London.

SHABANA, A., G.H. DAR AND A. Q. JHON. 2013. Exotic Ornamental Flora of Kashmir: A Field Guide. Dominant Publishers & Distributors Pvt. Ltd., New Delhi, India.

SHARMA, B. M. AND P. S. JAMWAL. 1988. Flora of Upper Liddar Valleys of Kashmir Himalaya. Vol. 1. Scientific Publishers, Jodhpur.

SHARMA, B. M. AND P. S. JAMWAL. 1998. Flora of Upper Liddar Valleys of Kashmir Himalaya. Vol. 2. Scientific Publishers, Jodhpur.

SHEKHAR, S., ARUN K. PANDEY AND ARNE A. ANDERBERG. 2013. The genus *Inula* (Asteraceae) in India. *Rheedea* 23(2): 113-127.

SINGH, G. AND P. KACHROO. 1976. Forest Flora of Srinagar and Plants of Neighbourhood. Bishen Singh Mahendra Pal Singh, Dehra Dun.

SINGH, J. B. AND P. KACHROO. 1994. Forest Flora of Pir Panjal Range (Northwestern Himalaya). Bishen Singh Mahendra Pal Singh, Dehra Dun.

SINGH, N. P., D. K. SINGH AND B. P. UNIYAL (eds.). 2002. Flora of Jammu and Kashmir. Vol.1 [Pteridophytes, Gymnosperms and Angiosperms (Ranunculaceae-Moringaceae)]. Botanical Survey of India, Kolkata.

STEWART, R. R. 1972. An Annotated Catalogue of the Vascular Plants of West Pakistan and Kashmir. In: E. Nasir and S. I. Ali (eds.). Flora of West Pakistan: 1–1028. Fakhri Printing Press, Karachi, Pakistan.

STEWART, R. R. 1982. History and Exploration of Plants in Pakistan and Adjoining Areas (eds. E. Nasir and S. I. Ali). Pan Graphics, Islamabad.

WU, Z.Y., P.H. RAVEN AND D.Y. HONG (eds.). 2011. Flora of China, Vol. 20–21 (Asteraceae). Science Press (Beijing) & Missouri Botanical Garden Press (St. Louis).

कश्मीर हिमालय, सिन्ध घाटी के वनस्पति जात में एस्टरेसी कुल

गुल हसन डार एवं बर्टिल नोरडेन्सटम

सार सारांश

सिन्ध घाटी कश्मीर की पार्श्व घाटी है, जो राजधानी श्रीनगर के उत्तर पश्चिम में है। यह अपनी संरचना के कारण शीतोष्ण कश्मीर घाटी एवं ट्रांस हिमालय शीत शुष्क जन्सकार व लद्दाख क्षेत्र को जोड़ती है, अतएव यह क्षेत्र उल्लेखनीय रूप से पादप विविधता को चित्रित करता है। प्रस्तुत शोधपत्र में सिंध घाटी के एस्टरेसी वनस्पतिजात को प्रदर्शित किया गया है। इस क्षेत्र का बृहतम कुल एस्टरेसी 5 उपकुलों, 13 शाखाओं के तहत 71 वंशों से संबंधित 143 जातियों को प्रदर्शित करता है। चार उपकुल टियोडी, मुरिसियोडी, कारडियोडी एवं सिकोरियोडी प्रत्येक एकल शाखा को दर्शाते हैं, जिसमें क्रमशः दो जातियाँ एक वंश में, एक जाति 21 जातियाँ, 11 वंशों में 37 जातियाँ 18 वंशों में निहित हैं, सबसे बृहतम उपकुल है। यहाँ *हेलिएन्थस एनस* लिनि., *हेलिएन्थस* लिनि. उप *क्राइसेथेमस कोरोनेटिम* लिनि. को मात्र उपज के रूप में पाया गया है। वंश जो चार अथवा अधिक जातियाँ दर्शाते हैं, उनमें *आर्टिमिशिया* (14) *सोसोरिया* (9), *सिसरबिटा* (6), *एस्टर* एवं *लेक्टुका* (प्रत्येक में 5) *एनफिलिस, बाइडेंस, इनुला* एवं *सोंचस* (प्रत्येक में 4) हैं।